Every Month £1.25 April 1987
DENMARK DKR 40.00
GERMANY DM 9.00
NETHERLANDS DFL 9.25

SINCLAIR

QL WORLD

TURBO takes the chequered flag

Creating a software system

Build your own toolkit asset

Games for gamblers

BEST adj; superlative of good: excelling or surpassing all others.

DIGITAL PRECISION

IS THE BEST . . . .

DIGITAL PRECISION has got exciting plans for your QL . . . . Software that transforms your machine. Software that is excitingly (even breath-takingly) fast, smooth and easy-to-use. Software that really WORKS.

We are absolutely committed to producing Software of the very highest standards. We never release a package if there already exists on the market a program of *even remotely* comparable quality. In everything we do, we simply HAVE to be the best. That's just the way we are. It certainly isn't the easy way! Good software takes brains, knowledge, imagination, research, dedication, time (Six MAN YEARS on **TURBO**, two MAN YEARS on **EYE-Q**, etc.) – not to mention blood, tears, toil and sweat. We aren't complaining. It is this approach that has made us the top QL software house. We aren't complacent either. Our products are subject to continuous improvements and refinements – excellence is a fast moving target. Eleven of the companies advertising in the March 1987 QL WORLD were marketing software which we rejected at our quality control stage – this list includes T***** and C***/Q****, incidentally! And virtually everyone has used our compilers and development tools – the few that haven't so far are knocking on our door for **TURBO** as this goes to press!

Reasonable press reviews are no guarantee of quality, as some magazines seem to give virtually everything a clean bill of health. However, **DIGITAL PRECISION** Software gets THE BEST reviews time after time! Rather than tediously listing hundreds of **highly** favourable press comments on our software, let us categorically state that:

IN ALL COMPARATIVE REVIEWS (INVOLVING ANY OF THE DIGITAL PRECISION SOFTWARE TITLES LISTED IN THIS ADVERTISEMENT) PUBLISHED IN THE LAST TWO YEARS IN ANY OF THE FOLLOWING MAGAZINES:

QL WORLD ☆ SINCLAIR USER ☆ QL USER ☆ POPULAR COMPUTING WEEKLY ☆ ZX COMPUTING ☆ YOUR SINCLAIR ☆ QUANTA

THE DIGITAL PRECISION PROGRAM WAS EITHER JUDGED TO BE THE OUTRIGHT WINNER (i.e.; THE BEST) OR, IN A FEW CASES, EQUAL FIRST – NOT GOOD, OR BETTER, BUT THE BEST . . . .

TURBO BASIC COMPILER including Turbo Toolkit	★ £99.95	THE EDITOR	★ £29.95
PROFESSIONAL ASTROLOGER with Astronomer	★ £69.95	SUPER ASTROLOGER DELUXE	£24.95
PROFESSIONAL ASTROLOGER	★ £59.95	CARTRIDGE MEDIA MANAGER (no disk functions)	£24.95
SUPERCHARGE COMPILER	£49.95	BETTER BASIC EXPERT SYSTEM	£24.95
SUPER MEDIA MANAGER	£39.95	SUPER BACKGAMMON	★ £12.95
THE EDITOR SPECIAL EDITION (Expanded QLs only)	★ £39.95	SUPER ASTRONOMER	★ £12.95
SUPERFORTH with REVERSI	£39.95	DROIDZONE	£9.95
EYE-Q (for GIGA Mouse)	£34.95	BLOCKLANDS	£9.95
EYE-Q	★ £29.95	REVERSI	£9.95
SUPER SPRITE GENERATOR	£29.95	ARCADIA	£9.95
TURBO TOOLKIT	★ £29.95		

★ Software products marked with a star are NEW, faster/more powerful versions, released on 20th MARCH 1987.

TERMS AND CONDITIONS

- ☆ Buy any 2 titles, get £1 off – any 3, get £2 off, any 4, get £3 off etc.
- ☆ Orders from abroad are welcome (we despatch Air Mail). Please add 5% for orders from Europe and 10% for orders from other countries, to cover airmail postage and packing costs. Cheques from abroad should either be drawn on a UK bank or be Eurocheques – if you are unable to obtain either of these add £5 to your order price to cover cheque clearing charges. UK prices are all-inclusive.
- ☆ If you have an early version of one of our programs, send us the microcartridge(s) (not the packaging) accompanied by £10 for an upgrade.
- ☆ All our software is 100% compatible with all memory expansion & disk systems.

IMMINENT

MASTER BRIDGE PLAYER Acol, good club standard, can even explain in plain English why it has made a particular bid, or why you are wrong!
DESK TOP PUBLISHING SYSTEM Superb machine code system, with huge selection of fonts, right justification, sideways printing, multitasking – fully compatible with EDITOR & EYE-Q output.
THE SPEED IS INCREDIBLE
IT'S THE ONE YOU HAVE BEEN WAITING FOR
3D CAD SYSTEM all in machine code.

CUT HERE

DIGITAL PRECISION

To: **DP, 222 THE AVENUE, LONDON E4 9SE** (Or use the Credit Card Hotline 01-527 5493)

Please rush me .....

Name ..... Address .....

..... Postcode .....

Enclosed ☐ Cheque ☐ Cash ☐ P.O. ☐ Access/Mastercard ☐ Visa/Barclaycard

for the amount of £..... Number ..... Expiry date .....

Please indicate if you have ☐ 3½" disks ☐ 5¼" disks ☐ Microdrives only

If you have disks, do you get ☐ 720 sectors ☐ 1440 sectors

Signature .....

SINCLAIR QL WORLD

CONTENTS

APRIL 1987

6	**QL SCENE** • Extended news coverage.
8	**OPEN CHANNEL** • Two pages of your letters.
12	**TROUBLE SHOOTER** • Tackling the software sellers.
16	**TURBO TAKES THE LEAD** • The new compiler on test.
20	**DIY TOOLKIT** • The second addition to our mini-toolkit.
25	**PUZZLE PAGE** • Test your mental agility.
27	**UTILITY FILE** • Design and debugging software reviewed.
32	**SOFTWARE FILE** • Including our buyers' guide to joysticks.
36	**QL EDUCATION** • Moving on to spelling.
40	**SOFTWARE APPLICATIONS** • Getting your programs to work together.
42	**BETTER BASIC** • Improve your technique.
45	**RAM PACKED** • A look inside the latest QJump utilities package.
47	**QL CONNEXIONS** • Our interface moves a stage nearer completion.
50	**THE PROGS** • Concluding 3D Designer plus something new.
55	**MDV EXCHANGE** • Off-the-peg readers' programs.

Editor
Ken McMahon BA
Sub Editor
Harold Mayes MBE
Production Editor
Jim McClure
Production Assistant
Isabelle Risner
Advertising Production
Nick Fry
Art Editor
Chris Winch
Design Assistant
Neil Tookey
Technical Associate
Marcus Jeffery BSc

Advertising Manager
Jane Brooks Wadham

Magazine Services
Sheila Baker
Anna Morrison

Publisher
Paul Coster BSc

Managing Director
Richard Hease

CONTRIBUTORS
Colin Opie
Mike James
Marcus Jeffery
Ron Massey
Mike Lloyd
James Lucy
Leslie Fahidy
Bryan Davies
J. F. Tydeman

Microdrive Exchange 01-731 7948
System Design

Sinclair QL World,
79-80 Petty France,
London SW1H 9ED.
Telephone 01-222 9090
Fax 01-222 0461
Telex 9419564 FOCUS G
ISSN 0268067X

Back issues are available from the publisher price £1.50 U.K. £3 Overseas. Please telephone 01-222 9090 to check availability.

Published by Focus Magazines Ltd, London

Distributed by Quadrant Publishing Services, Sutton.

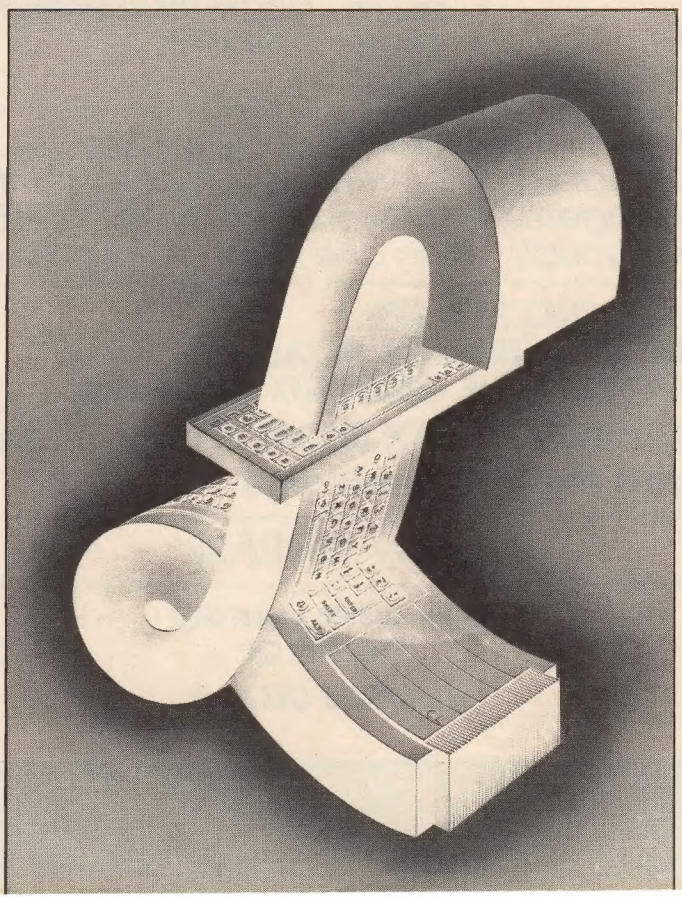
Subscription information from: Quadrant Subscription Services, Oakfield House, Perrymount Road, Haywards Heath, West Sussex 0444 459188 (£15 U.K. £30. Europe. £45 rest of the world)

Please allow 5 weeks from date of order to receipt of first subscription copy

Typesetting and make-up by Cradley Print PLC, England.

Printing by Cradley Print plc, England.

©COPYRIGHT SINCLAIR QL WORLD — 1987



NEXT MONTH

The business

Our in-depth analysis of financial and business software has been consigned to the QL safety deposit box for a month due to the long-anticipated arrival of Turbo which has taken its place in this issue. All things financial will be revealed next month.

Trivia

We will be looking at the new Talent PCB design software and, also on the drawing-board is a review of colour plotters. Ron Massey will be checking the options for those who want to acquire a disc drive without breaking the bank and for those who prefer more Trivial pursuits we will be trying the new quiz game from Talent.

SANDY QL SPECIALS

—NEW PRODUCTS—

SUPERMOUSE FOR SUPERBOARDS — factory fitted upgrade provides high quality mouse with full pointer/real windowing/multi-tasking front end plus QRAM UTILITIES from QJUMP and CADPAK graphics program.

SUPERDISK — 3.5″/5.25″ disk interface & parallel printer port with RAMDISKS, disk management utilities: compatible with all memory expansions/ROMs — tremendous value!

QROM — the ultimate QL ROM disassembly fully explained with notes and examples — essential reading for every serious enthusiast.

QPLUS+ — customise your QL front end — generates a system disk or microdrive to match your exact set up. Single key menus/printer select/special commands/ comprehensive manual.

FUTURA 68000 PC — fully QL compatible — the machine of the year from Tony Tebby and Sandy Technology.

—HARDWARE—

SINCLAIR QL 128K		120.00
SINCLAIR QL 640K		199.00
THRU-CON RAM CARD 512K		96.00
SUPERDISK INTERFACE		88.00
SUPERQBOARD	0K RAM	120.00
	256K RAM	199.00
	512K RAM	215.00
SQB UPGRADE	0-256K	84.00
	0-512K	119.00
	256-512K	40.00
SQB SUPERMOUSE UPGRADE		87.00
SINGLE 3.5″ DISK DRIVE		125.00
DUAL 3.5″ DISK DRIVE		190.00
BARE DISK DRIVE NEC 3.5″		80.00
MICROVITEC CUB MONITOR		
COLOUR		254.00
WITH TILT/SWIVEL		274.00
BOXER 12 HI-RES GREEN		94.50

IBM STYLE KEYBOARD/INTERFACE	130.00
QEP 111 EPROM PROGRAMMER	115.00
QEP EPROM CARTRIDGE	5.99
10 VERBATIM 3.5″ DSDD DISKS	24.99
MICRODRIVE PACK OF 4	6.99
NEW MICRODRIVE CART LOOSE/10	16.65
PARALLEL PRINTER CABLE	10.00
QL KEYBOARD MEMBRANE IN STOCK	
QL SPARES/FAST REPAIRS	
QRAM	29.90
CPM EMULATOR FOR QL	34.95

—SOFTWARE—

RAM DISK	7.50
QPLUS+	14.95
QROM DISASSEMBLY AND MANUAL	35.00

SUPERBOARD — *The most sophisticated peripheral for the QL: fast RAM: 5.25″/3.5″ multi-standard disk interface: parallel printer port: spooler: ramdisks: disk management software: full Supertoolkit II from Tony Tebby: extensive manual: all on one small plug-in card.*

SANDY (UK) PCP LTD.
UNIT 33, MURDOCK ROAD,
MANTON LANE, BEDFORD MK41 7PQ

TELEPHONE (0234) 219814 **FAX (0234) 270133** **TELEX 82392**

Export enquiries welcome

NEW RELEASE

NEW SUPER DIGITISER FOR THE QL

RING FOR DETAILS.

Micro Anvika

220a Tottenham Court Road, London, W1P 9AF. Tel: (01) 636 2547
Kamla Electronics, 251 Tottenham Court Road, London, W1P 9AF. Tel: (01) 580 6382
Telex 946240 Cweasy G (Quote 19010170) (24 hr Mail order)

Leisure

Wanderer (Pyramide)	£ 18.00
Othello (Pyramide)	£ 13.00
Vroom (Pyramide)	£ 13.00
Mortville Manor (Pyramide)	£ 18.00
Dragon Hold (Rubicon)	£ 19.00
Aquanaut (Micro deal)	£ 18.50
Flight Simulator (MD)	£ 18.50
Chess (Psion)	£ 18.00
BJ Return (Eidersoft)	£ 12.00
Spook (Eidersoft)	£ 10.00
Karate (Eidersoft)	£ 13.00
3D Slime (Datalink)	£ 12.00
Lost Pharoahs	£ 14.50
Jungle Eddi	£ 14.00
Nemesis	£ 14.00
Bucklands	£ 9.00
Droidzone	£ 9.00
Mr Smith	£ 13.00
Executive Adventure	£ 18.00
Cosmos	£ 14.00

Special Pack
Citadel/BJ 3D/Zapper
£14.95

Graphics

TechniQL (Talent)	£ 47.00
QDraw (Talent)	£ 13.00
QL Peintre (Pyramide)	£ 13.00
Nucleon (Pyramide)	£ 18.00
Cad Pak (Datalink)	£ 14.00
Tasprint (Tasman)	£ 19.00
Tascopy (Tasman)	£ 14.00
Eye-Q (V2)	£ 29.00
Viewpoint (Rubicon)	£ 18.00
Sideways (Talent)	£ 18.00
BCB Designer I (Talent)	£ 95.00
BCB Designer II (Talent)	£ 95.00

Languages & Utilities

Digital Turbo	£ 85.00
Digital Supercharge V1.18	£ 49.00
Digital Forth+Reversi	£ 26.00
Digital Super Monitor	£ 18.00
Digital Editor	£ 24.00
Metacomco Latice C	£ 85.00
Metacomco APL	£ 85.00
Metacomco MCC Pascal	£ 79.00
Metacomco Lisp	£ 51.00
Metacomco BCPL	£ 51.00
Metacomco Assembler	£ 33.00
Prospero Fortran 77	£ 95.00
Prospero Pascal	£ 95.00
Talent Assembler Workbench	£ 24.00
ICE	£ 26.00
Choice	£ 15.00
Toolkit	£ 11.00
Artice	£ 14.00
Icicle	£ 19.50
QSpell (Eidersoft)	£ 24.00
Archiver (Eidersoft)	£ 17.00
Super Media Manager (DP)	£ 36.50
Cartridge Doctor	£ 14.95
Mail List (Transform)	£ 24.00
Appointment Dairy (Transform)	£ 24.00
Stock Control	£ 14.95
Hisoft Devpac	£ 39.95
Digital Professional Astrologer	£ 57.00
Task Master	£ 24.95
Front Page	£ 21.00
QL Toolset (Talent)	£ 18.00

Hardware

QL Computer	£ P.O.A.
MicroVitec Cub 1451/DDT3 With Stand	£280.00
Philips CM 8533 Colour monitor	
Composite Video (phono)	
RGB to Linear input (SCART)	
RGB/RGBI to TTL (for QL)	
plus many other features	£275.00
Philips BM7502 Mono Man	£ 84.00
Panasonic KX1080	£189.00
Star NL10	£249.00
Epson LX86	£230.00
Citizen 120D	£199.00
Citizen LSP10	£225.00
Onyeer daisy wheel printer	£175.00
Miracle Centro I/Face	£ 19.00
Miracle 512K Expanderam	£ 98.00
Miracle Ram Disc Software	£ 12.00
Miracle/Q-code Modaptor Plus	£ 38.00
Miracle 1200/75 Modem	£ 49.00
Miracle WS2000 Modem	£ 99.00
Miracle Systems QL Modem	£ 49.00
PCML Disc Interface	£ 98.00
PCML Dual 3.5" Disc Drive including I/F	£299.00
Cumana Disc Interface	£ 89.00
Cumana Dual 3.5" Disc Drive including I/F	£289.00
CST Disc interface	£ 79.95
Dust Cover for QL	£ 4.95
Cart (Hard) Storage Box	£ 4.95
Cartridges in 4 Pack	£ 8.50
QL Membrane	£ 9.95
QL Transformer	£ 24.00

Special Limited Offer Only

The lowest cost 180 CPS NLQ PRINTER AVAILABLE ANYWHERE!

Features: –180 CPS draft
–36 CPS NLQ
–Tractor & friction feed
–Epson control code compatible
–3K buffer

All this including
Miracle QL Centronic Interface
for only £199.00 incl VAT

Psion Organiser

Psion Organiser CM	£ 99.50
Psion Organiser XP	£139.50
8K Datapak	£ 12.95
16K Datapak	£ 19.95
32K Datapak	£ 34.95
64K Datapak	£ 79.95
128K Datapak	£169.95
Finance Pack	£ 29.95
Maths Pack	£ 29.95
Spelling Checker	£ 29.95
RS232 I/F	£ 47.95
Link Up Adaptors	£ 12.95
Mains Adaptor	£ 12.95
Formatter	£ 44.95

We also stock other makes of computers, peripherals & software for Amstrad, Atari, Commodore (Amiga) etc. . .

All prices are **including VAT.** Postage above £20 on **software** is free.
Please add 50p to order under £20. For computer, printers and monitors please add £9.00 per item. Postal rates apply to **UK** only.
All goods subject to availability. Please phone for current stock availability.
Overseas orders are welcomed.
VISA AND ACCESS WELCOMED

VISA

E&OE

Access

PUT *Fresh* TALENT TO WORK ON YOUR QL!

YOU'LL FIND FULL DETAILS ABOUT OUR LATEST QL UTILITY PROGRAMS IN THE TALENT MAIL ORDER CATALOGUE. PHONE OR WRITE FOR YOUR **FREE** COPY TODAY!

BASIC-ALLY

by Eddy Yeung

BASIC-ALLY is an indispensable aid for all SuperBASIC programmers. It provides powerful debugging facilities similar to those found in machine code monitors. An elegantly-designed, easy to use package by the author of the best-selling ASSEMBLER WORKBENCH.

£29.95 (+ 50p p&p)

QIMP

by L. Hirschbiegel

A flexible, attractive and user-friendly front-end system for your QL. The program uses a combination of icons and drop-down menus to call up system commands and can be operated from the keyboard or used with the ABC mouse. Includes a wild-card file option and a sub-directory device driver. thus making all other files on the medium completely transparent to QDOS.

£39.95
(+ 50p p&p)

For Healthy Microdrives you need the Cartridge Doctor **£14.95** (+ 50p p&p)

QL TOOLSET

by Barry Silver

The package consists of over 100 extensions to SuperBASIC, which greatly increases the QL's file handling and graphic capability. The package is designed to save hours of tedious coding and will help you to carry out any task in SuperBASIC faster than you had thought possible!

A really useful addition to your library!

£19.95 (+ 50p p&p)

SIDEWAYS

by N. Clift

This useful program prints everything sideways. It's ideal for spreadsheets or any text file which is wider than your printer paper.

You are given the choice of several print modes and options. You can set the print-size parameters to print out a complete spreadsheet on a single sheet of A4 paper. The Booklet mode allows you to print two pages to a sheet for binding down the centre or single pages for binding down the side. Pages may be outlined and printed several to a sheet across or down.

A comprehensive instruction manual accompanies the package.

£19.95 (+ 50p p&p)

PRINTED CIRCUIT BOARD DESIGNERS 1 & 2

£99.95
(EACH)

Write or phone for details of our free 14-day trial offer.

Save Money!!

WHEN YOU JOIN THE TALENT MAIL ORDER CLUB. FULL DETAILS IN OUR CATALOGUE!!

TALENT
COMPUTER SYSTEMS

Curran Building, 101 St. James Rd, Glasgow G4 0NS.

ACCESS & VISA welcomed

041-552 2128

TALENT'S FUTURE WITH THE FUTURA! write for details

QL SCENE

CP/M for the QL

Ultrasoft has announced the imminent release of a CP/M operating system for the QL. CP/M is possibly the world's most widespread operating system and literally thousands of applications run under it including *WordStar, Multiplan* and *DBase II.*

The CP/M emulator is entirely software-driven and will be supplied on an EPROM cartridge. It will run on a standard 128K machine using either Microdrives or floppy discs. Terminal emulation allows the use of full screen editors and it features what Ultrasoft call an enhanced console command interpreter with line editing.

The arrival of CP/M for the QL could be heralded as the most significant software development since the QL was launched. Although the Z-80-based operating system is considered somewhat long in the tooth, the profusion of programs available makes it an attractive proposition. It will also be possible for programmers to develop CP/M-based applications for other machines.

Organiser sales top £1 million a month

Psion, the company responsible for writing Quill, Archive *et al,* has announced sales figures of more than £1 million per month for its Organiser II pocket computer.

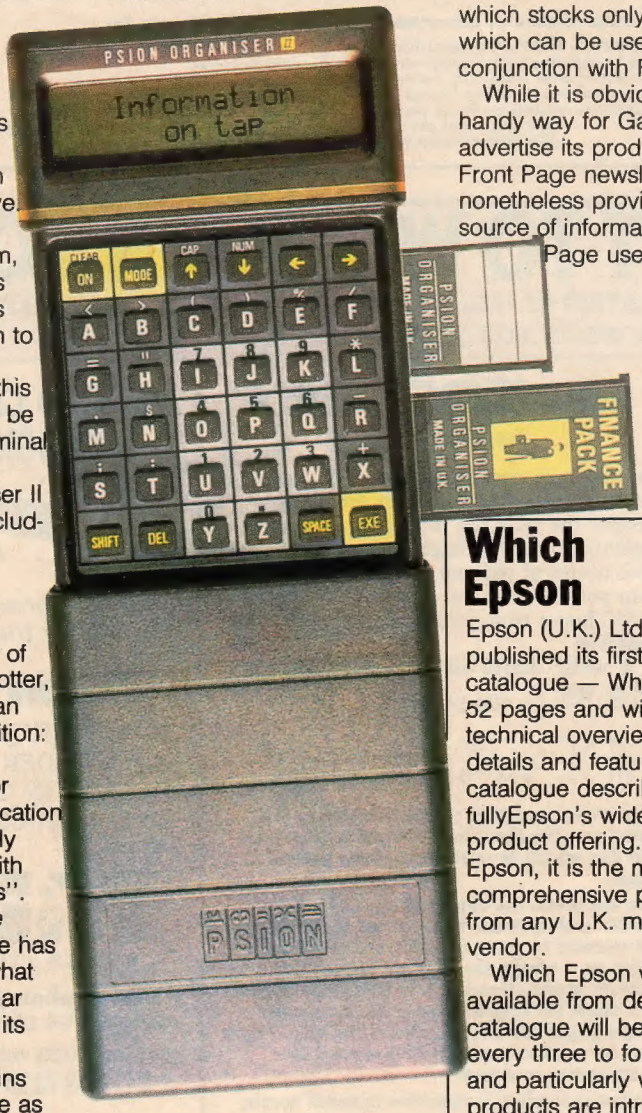
The Organiser II uses a programming language called OPL which is very similar to Archive. Two companies, Eidersoft and Transform, produce comunications software which enables Organiser II information to be downloaded to the QL and vice versa. In this way the Organiser can be used as a portable terminal.

Psion credits the success of the Organiser II to its many features including a built-in diary, calendar, multiple alarms and its programmability. Chairman and founder of the company, David Potter, said of the the American and Japanese competition: "They either cost thousands of dollars for the same level of application utility, or they are purely consumer machines with very limited capabilities".

Using its *Front Page* program, Gap Software has produced the first of what promises to be a regular newsletter for users of its software.

The first issue contains news about Front Page as well as more general information about the QL software scene. There are brief reviews of all the software sold by Gap, which stocks only products which can be used in conjunction with Front Page.

While it is obviously a handy way for Gap to advertise its products, the Front Page newsletter nonetheless provides a useful source of information for Front Page users.



Which Epson

Epson (U.K.) Ltd has published its first-ever range catalogue — Which Epson. At 52 pages and with its mix of technical overviews, product details and features, the catalogue describes fullyEpson's widest ever product offering. According to Epson, it is the most comprehensive product guide from any U.K. microsystems vendor.

Which Epson will be freely available from dealers. The catalogue will be updated every three to four months and particularly when new products are introduced to the Epson range.

Brother launch printers

Two new advanced printers will be launched by Brother at the Scottish Computer Show — a dot matrix and a daisywheel both the fastest in their range.

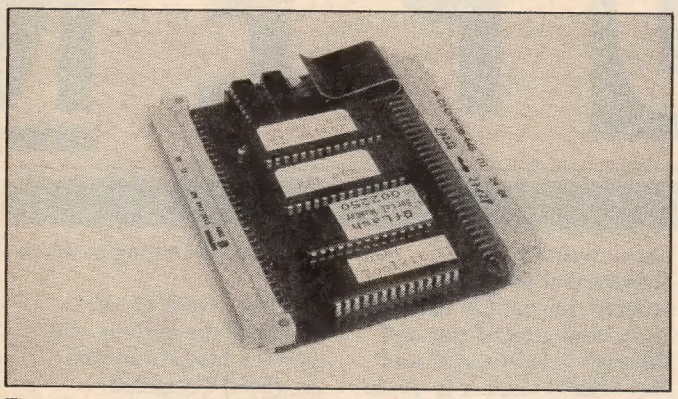
The 4018 is the first 18-pin dot matrix printer in the Brother range and operates at a speed of 480 characters per second — 115 lines per minute — and 100 cps in near letter quality. It is believed to be the fastest dot matrix printer on the market using just one head and has the added advantage of a bottom paper feed as well as top feed. A straight paper feed path makes it ideal for applications such as production of hotel bills and airline tickets. The printer is also capable of printing in colour using an upgrade kit and also features a standard 48K input buffer.

The latest in its highly-popular HR range of printers, the HR-40 is a streamlined machine offering a print speed of 40 characters per second, plus a built-in tractor feed and sheet feeder which are normally expensive options.

Also on display will be the 1709 — a new, wide carriage (136 cols), dot matrix printer which operates at 240 characters per second and has a near letter quality facility of 50cps. With a memory of 24KB and an operation noise level of only 55 decibels it is the top of a highly-successful series which includes the 1109, 1409 and 1509 models.

For further information on Brother printers contact: Brother Computer Peripheral Division, Shepley Street, Guide Bridge, Audenshaw, Manchester M34 5JD. Tel: 061 330 6531.

Chip Board



The horizons for the Q Flash *Chipboard*, marketed in the U.K. exclusively by TK Computerware, are expanding continually. Developed initially to eliminate the octopus problem of sticking pieces to the outside of the QL, the possibilities of allowing users to dedicate their QLs for particular applications is providing excitement in a number of software houses.

Utilising the two 128K expansion slots in the QL memory map at $C000 to $FFFFF hex 786432 to 1048575 dec, users can incorporate software selection of Chipboard EPROMS with up to 256K, without disc drives, or 128K if a system is fitted with discs.

TK Computerware is offering a range of EPROM which have previously been more at home protruding from the back of the QL for use with the Chipboard system. Discussion with many of the major software houses is under way for the supply of popular programs on EPROM rather than some form of magnetic media such as disc or cartridge.

If, and when agreement is reached by the parties concerned, users will, by inputting an initialising keyword, be able to have a an optionally-dedicated QL, whether for desk-top publishing, graphics or a host of other uses, readily to hand.

Colour re-inking

Nick Godwin tells us that his Scottish-based mail order fabric ribbon re-inking service Aladdink can now undertake colour re-inking. Hitherto only black was available. Colours available are blue, brown, red, green and purple, but others may be available on request. Even gold can be arranged.

While Aladdink cannot change the colour of your ribbon, Godwin says: "If you supply us with a used coloured cassette, we can re-ink it".

He is also able to put customers who want to change to colour in touch with a supplier of ribbons suitable for most makes of printer — just telephone him or write enclosing a stamped addressed envelope.

Nick Godwin, Aladdink, 4 Hurkur Crescent, Eyemouth, Berwickshire, Scotland, TD14 5AP. 'Tel: 08907 50965 (10am-10pm).

Pyramide disc drive system

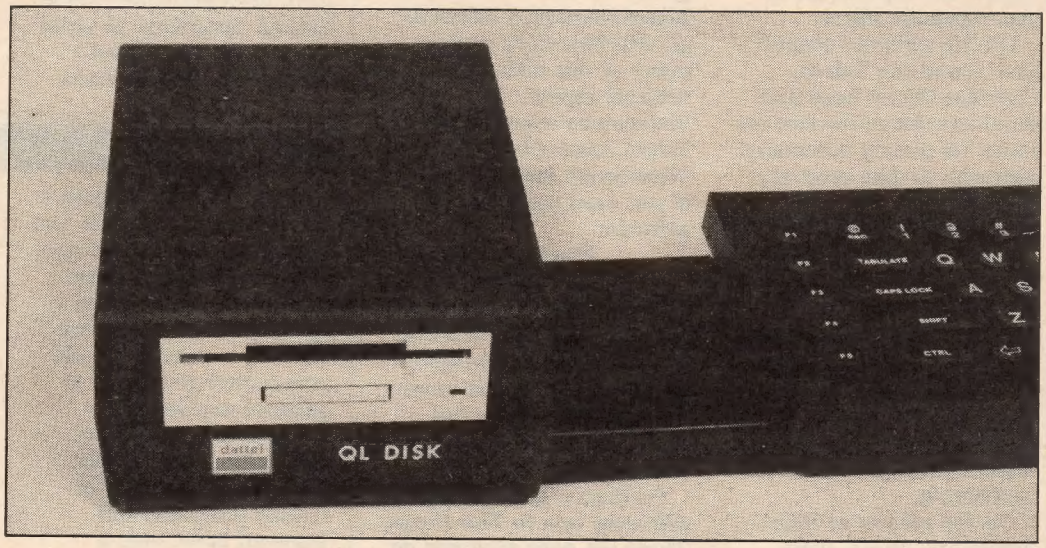
To an ever-increasing range of products, Pyramide has acquired sole rights to the disc drive system intended originally for release by the now-defunct French company Direco.

Supplied as a complete and very economical single drive system, *QL Disk* includes its own interface, toolkit and separate 12V power supply; the unit connects as an in-line assembly to the QL at the expansion port.

Provision for expanding a single drive to twin discs is built-in, requiring a single ribbon cable connected at the rear of each drive and stacking the units together. A 500K unformatted system, QL Disk provides users with 360KB of disc storage media in 40-track, double-sided format on standard 3½in discs.

Memory expansion is not built into the interface. Users wishing to add extra RAM to their systems can take advantage of the economical 512K internal upgrades provided by Rainbow Digital Repairs, Sector Software and a number of other main QL suppliers.

Data stored on QL Disk-produced media can be read by the higher density 1MB drives; the reverse, however, is not true. Users wishing to exchange discs with others can, however, format a disc in their QL Disk and the higher-density drives will write to the 360K formatted media.



Toolkit options include bi-lingual language prompts — the preview version supplied defaulted to the French. Prompt selection may be made, after pressing (F1) or (F2), by inputting "ENGLISH" or adding an equivalent line to BOOT programs.

Toolkit commands are extensive and, while not in the more conventional Tebby/ Qjump structure, nonetheless include similar commands, as well as a number of useful commands exceptional to the QL Disk system.

Catalogue commands include the conventional DIR as well as CAT. The latter command details file statistics such as name, size and last date it was saved.

The range of COPY commands include DUPLIC, which copies a single file and date-stamps it from one device to another and BKP, which copies a whole medium from one device to another. Other commands allow the user to copy from mdv to disc, changing file occurrences of "mdvn" to a disc drive call automatically, either drive one to drive one occurrences or all mdv occurrences to disc drive only.

In addition to the conventional SAVE, SEXEC and OPEN commands, users can over-write existing files with either SAVE-OVER, SBYTES-OVER or OPEN-OVER.

Other file-handling routines include RENAME and SEARCH; a complete range of multi-tasking environment commands for job control; binary and hex number conversion utilities.

Users wishing to avail themselves of the many advantages of a disc-based system can now do so at a very economical price.

OPEN

Open Channel is where you have the opportunity to voice your opinions in *Sinclair QL World*. Whether you want to ask for help with a technical problem, provide somebody with the answer, or just sound off about something which bothers you, write to: Open Channel, Sinclair QL, Petty France, London SW1H 9ED.

Grounded

Owning a QL for two years, I have encountered many of the frustrations — non-existent Sinclair customer support — and the elations — good readers' program — about which other users write.

Having watched a graphic simulation recently on Microlive of the reasons why pseudo 32-bit micros fail to live up to the makers' promise, I now realise why Quill is so slow. The QL was singled out by name as being particularly let down by its 32-bit architecture being linked to an 8-bit data bus.

In spite of its limitations, I respect the capabilities of this enigmatic micro.

On the software scene I have found the Talent, *Cartridge Doctor* head and shoulders above the rest for value, its mainly automated approach to data recovery being particularly welcomed by a novice like myself.

I concur with the reader from Leuchars who derated the one and only *Flight Simulator* as being beneath the dignity of QL, in spite of near rave reviews in this magazine. The reviewer obviously was not a pilot as I suspect the man from Leuchars is.

On the subject of flight simulators, would some enterprising software house produce a product worthy of the QL — at least to the standard of those available for the Spectrum/Amstrad. The rewards for such a product would undoubtedly be great.

I have found Rob Sherratt's file-copying routines, obtained from Microdrive Exchange, brilliant, particularly the extremely professional printer driver, although Paolo Baccanello's file-handling utilities program given free with *QL User* in February 1985 takes some beating. *QL World* would do well to feature this program again for the benefit of new readers, if only to save them buying one of the inferior commercial offerings.

Starport from Karl Jeffery gives welcome light relief from my increasing use of the QL. For business, with Tony Quinn's *Q-CAD*, also obtained through the Exchange, finding increasing favour for that quick doodle to impress my boss.

Many new readers ask about good books to introduce them to various aspects of programming the QL. For Super-Basic Ian Sinclair's *QL Computing* is one of the best. For machine code starters, *Machine code programming on the Sinclair QL* by Martin Gandoff and Adam Denning's *Advanced QL Machine Code* explain many of this difficult subjects aspects. The Metacomco assembly kit and Talent Assembler Workbench are my choices if you need machine coding software.

Hughie McGovern, Bolton, Lancs.

Editor's reply: It is a sad, but true fact that there is no decent flight simulator for the QL. What is more, software houses do not seem keen to take up the challenge.

Perhaps a QL aeronaut will send one to The Progs. Those we have received do not quite make the grade. We live in hope.

A need for speed

I have written a three-dimensional graphics program for the QL using SuperBasic procedures and although it works well and does what I want it to do, it is very slow in execution. To speed it, I have been thinking about changing it into machine code but I do not know assembly language programming and I do not have time to learn it from scratch. I have therefore been looking at compiled code and there seem to be three possibilities:

Use a SuperBasic compiler, e.g., Supercharge or Liberator; re-write the program in Forth, which I have used previously on a Sinclair Spectrum; re-write in Pascal, which I feel I could learn, having done some programming in *dBase III*.

What I want to ask is which of the options will give the fastest-running program? Compiled SuperBasic would be the simplest option but would it be as fast as one of the other languages? Many of the calculations required involve using sines and cosines and would need to be done in floating point arithmetic.

T. Ashcroft, Newcastle upon Tyne.

Editor's reply: When you take into account the time you will have to spend re-writing the program, the quickest and simplest option would probably be Turbo — see the review on page 16 which gives some speed comparisons.

Reader's recommendation

I suffer from Huntington's Chorea and for the last two years I have been getting a great deal of satisfaction from using my children's Spectrum with a sensible keyboard, to keep the old grey matter going and to improve my dexterity.

My illness causes pre-senile dementia and the 'shakes', so a variety of serious programs and Tasword have been a blessing to me, although I have long hankered after a QL.

I was lucky enough to be able to buy one at a price I could afford, mainly because there was no manual or Psion package. Much time and telephone money was expended on trying to locate the missing essentials.

Steve, the owner of Nimbus Computing at Park Langley, near West Wickham, Kent, had a spare set and sold them to me at a very reasonable price.

Colin, of Transform, Beckenham was able to supply me with a suitable printer lead interface and spent ages photocopying a printer manual to make it easier to understand the setting-up.

Both firms were very helpful and offered to provide any further assistance I might require either by visiting me or by telephone. It was a delight to find a QL and two such companies all in a few days and I recommend all three to your readers.

John Eldridge, London SE16.

Quest for support

About a year ago I bought the Quest/Sinclair QL *Cash Trader* package, which users will know requires using the Boot Master cartridge each time for security verification. All was satisfactory until recently, when the Boot Master became faulty, so I returned it to the Trader Support Club at Camberley, as specified in the manual.

Six weeks and no contact later, I discovered that Quest have been taken over —but excluding any Sinclair-related products — and that my cartridge is probably festering in some long-untended letterbox.

Meanwhile, I am stuck with £70 worth of unusable accounts program, not to mention all the data I have put in and now cannot access.

D. P. Mackenzie Smith, Bristol.

Editor's reply: Next month's business feature will have full advice for Cash Trader users.

CHANNEL

Constructive

You have most likely been told enough times by now about the error in page layout of the Progs in the December issue. I therefore will not say more about that. Instead, I would like to mention that your comment on the *Multimaze* program is non-constructive in criticising the fact that on viewing the maze one was returned to a new maze, thus defeating the object of viewing the maze.

Constructive thinking would have told the reader to alter the program with the idea of publishing the best improvements to the program in the way of user-friendliness, graphics and any likely bug correction. In that way you fill white-space with possible improvements of past-published programs instead of complaints about a program crashing on line so and so.

As an example, here is one idea on altering the Multimaze program:

Delete lines: 290; 300; 1240; 4280; and 4290.

Insert lines:

```
1025 INK # 0,4: AT # 0,2,5: PRINT # 0,"Press 'T' to view the maze": INK # 0,7
1231 AT # 0,2,5: PRINT # 0,"          ":REMARK 32 spaces
1232 INK # 0,2:AT # 0,2,10: PRINT # 0,"OW!": INK # 0,6: PRINT AT # 0,2,14: PRINT # 0,"That hurt!":BEEP 6000,1:PAUSE 50
1233 AT # 0,2,10: PRINT # 0,"          ":REMARK 16 spaces
1255 INK # 0,4:AT # 0,2,5: PRINT # 0,"Press 'T' to view the maze": INK # 0,7
4271 AT # 0,2,2: PRINT # 0,"Press 'r' to return to maze"
4272 AT # 0,3,2: PRINT # 0,"Press 'n' for a new maze"
4273 z$ = INKEYS(-1)
4274 IF z$ = = 'r':CLS # 0: INK # 0,6: UNDER # 0,1:FLASH # 0,1:AT # 0,2,15: PRINT # 0,"CHEAT":BEEP 10000,25:PAUSE 100: FLASH # 0,0: UNDER # 0,0: INK # 0,7: CLS # 0: GO TO 1025
4275 IF z$ = = 'n': CLS # 0:GO TO 110
4276 ELSE GO TO 4273
```

Alter lines: 160; 170; 230; 290 to 160 inp$ = INKEYS(-1):IF inp$ = = 'F' THEN CLS:STOP

```
170 IF inp$ < > 'd' AND inp$ < > 'D' AND inp$ < > 'P' AND inp$ < > 'p' THEN GO TO 160
230 IF inp$ = = 'p' THEN
290 PRINT "the whole maze."
```

Lines 160, 170 and 230 handle possible bugs, i.e., Capslock on/off.

Now the complaint. In *Bomber* by D Marsh I crash out on line 850, i.e., CALL do-graph x%,y%,s%,c-tab

I have checked lines 460 to 610 reference DATA statements and parameters. Please explain where I have gone wrong.

D. Brawn,
Brighton.

Quirky Sinclair

I find it difficult to take Sir Clive Sinclair seriously. Sinclair through the years produced the class D amplifier, which did not work; the black watch, which I believe did not work; the pocket calculator, which worked to some extent; and then his successful computers, the ZX-81 and the Spectrum, which worked, provided you were prepared to tolerate such quirks as RAM pack wobble and mushy keys.

Now he criticises his engineers for incorporating the 68008 processor into the QL, saying that the customer would have been satisfield with yet another Z-80 machine. I can scarcely believe that. I am not a hacker but I would never have bought a Z-80-based QL. I would probably have turned to a PC clone instead.

The relative failure of the QL has had nothing to do in my opinion with the processor but with the failure to produce properly-working machines in time and then not to support them with hardware expansions and better software.

That was left to outside suppliers, who have done a good job. If from the outset the QL had been immediately available with memory expansions and disc drives as options, I think it would have then attracted favourable reviews. The press was very hard on the machine. Mine has worked well and did all the work I expected of it. I am now replacing it with a Thor but I shall keep it to work on the Thor network as needed.

Frank Gutteridge,
Geneva,
Switzerland.

Software for scientists

I am the owner of a 640K JS ROM QL with Tony Tebby's EPROM Toolkit added. I am a student studying chemical engineering in London and much of my work involves the writing of essays and project reports, which I do using Quill, occasionally using Easel for scientific graphs.

I find this serves me very well except in one major area. By nature, the reports involve a large number of both mathematical symbols and the Greek alphabet and I am having extreme difficulty finding a suitable way to incorporate them into both Quill and my printer, a Canon 1080A.

I realise that I could write a large program which would enable me to use the codes generated by CONTROL+KEY to produce the desired character on the screen within Quill, and translate it into either a graphics or user-defined character to be printed. That would involve a large amount of time and computing knowlege which I do not have. Also, for that matter, the Translate options within INSTALL_BAS are of no use to me as I know of no way to extend the number of translatable characters beyond 10, which is not sufficient to cover the characters, more than 50 of them, I have in mind.

In trying to solve this problem I have collected several programs which do part of the job i.e., allow entire graphic fonts to be defined for the printer, re-definition of the high typeface Quill characters — but none of them does exactly what I require and to alter them to suit my need would require a large amount of program re-structuring.

I would be grateful if you could help me in any way with this problem. Has anyone written such a package or packages to modify Quill for scientific use, or can anyone suggest ways in which such a program might be constructed?

C. Keener,
London W6.

Editor's reply: Two packages which may be of use to you are Tasman Software's* Tasprint *and* Inkwell *by Palantir.

Care Electronics is working on software which sounds as though it may do the job. It works from within Quill and includes a mathematical character set.
Care Electronics. Tel. 0923 672102.
Tasman. Tel. 0532 438301.
Palantir Products, 60 St Lukes Road, Bedminster, Bristol.

Hallmark Software

Hallmark lets you enter the world's largest software library with a real CP M/ulator.

Now many thousands of different software programmes can be run — well over 10,000 — a lot of them business and a lot are free under Public Domain.

CP M/ulator runs any well-behaving CPM programme.
Z80 or 8080 machine code.
User friendly interface. Works with any QL Device (disks, Harddisks, Ramdisks etc.)
Easy to install in your System.
100% machine code — it doesn't RUN IT SPRINTS.
Terminal emulation allows use of full screen editors.

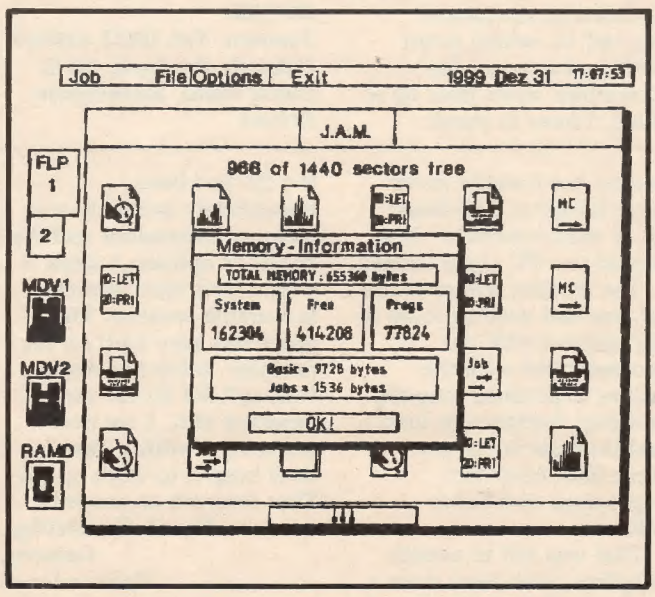
The CP M/ulator GIVES YOUR QL A NEW LEASE OF LIFE.
A whole new world of software has been opened to you.
Hallmark Software cares for your QL by giving you what you need.

J.A.M.

Job Application Manager

J.A.M. is a front end desk-top manager programme using an icon environment. J.A.M. has its own internal dynamic ramdisk which does not need to be formatted. J.A.M. has its own job scheduler, **you can multitask the PSION suite (Quill etc.) without any additional software.** Notepad and job controls are standard. Customise your own JAM to suit your needs. Mouse compatible. Features Icon environment, System Internal Dynamic Ramdisk, Desk-Top Functions, Job Manager, the Psion Suite can be multitasked without any additional software.

DM59.00 £19.95



QWRITER

QWRITER turns your printer into a writer, easily, quickly and with no bother at all. Many founts to choose from.
QWRITER lets you write while others print.

DM49.90 £14.95

QWRITER lets you write
write with QWRITER

QWRITER lets you write
write with QWRITER

QWRITER lets you write
write with QWRITER

QWRITER lets you write
write with QWRITER

QWRITER lets you write
write with QWRITER

QWRITER lets you write
write with QWRITER

GRAPHICS CONSTRUCTION KIT

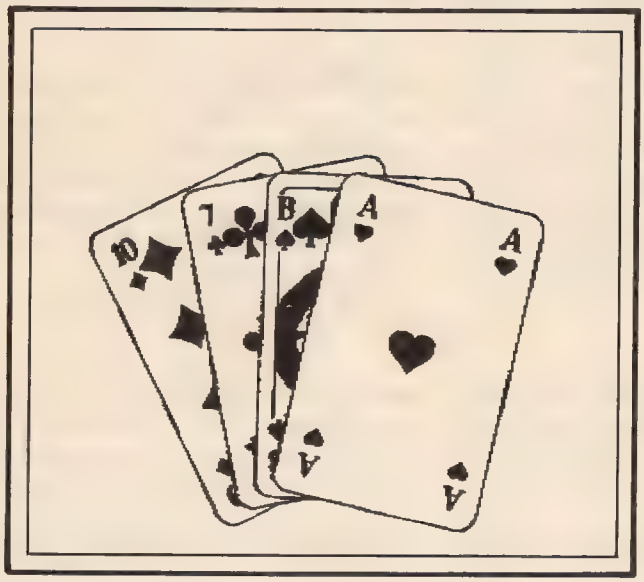
Now you can write your own customised graphics program in minutes, i.e. a package like EYE-Q (copyright Digital Precision) should be possible with about 8 KB of Basic, which can be compiled if necessary.

A set of Superbasic extensions that really allow you to design a program that suits your needs and not to suit your needs to the program. Comes with a free demonstration program and a comprehensive user handbook. DM49.90 £14.95

FULL HOUSE

Reviewed in QL World 11/86: ' . . . it is good fun to play, worryingly addictive . . . '

100%. Machine code. Superb colour graphics. You need nerves of steel to play. A fruit machine poker game completely identical to many machines found in German pubs. DM39.90 £12.95



MANDELBROT MAGIC

Discover the beauty of the world of fractals with MANDELBROT MAGIC. Extremely fast — from about 4 minutes with fixpoint arithmetic. MANDELBROT MAGIC is fully multitasking and can run in the background while you work in the foreground. Let your QL show you its true calculating nature. £14.95

RETURN TO EDEN

A full graphics adventure that really puts you in the game — is supplied on three diskettes — over two hundred screens — a graphics adventure that puts you to the test. You play in real time — day and night — with active screens. In your role you must free the King's son Morkin.

DM69.00 £19.95

U+5

— a buffered port extension for 5 cards. Now you can use the hardware your QL was built to take without removing the cards every time you want to work.

DM299.00 £99.99

QCARD

— a romport extension card to take up to six eproms. Switchable between 32KB and 16KB eproms. Let your romport work and have a longer life.

DM129.00 £39.00

QKEY

— the KEYBOARD conversion for the QL. IT has been available since the 27.01.87. Need we say any more.

DM169.00 £49.99

HALLMARK HARDWARE & SOFTWARE UTILITIES AND PERIPHERIE FOR THE SERIOUS USER

Main Distributor	: **Hardware & Software Systems, Maximilian Str. 42a, D-4400 Müenster. Tel: 0251 271653**
UK SOFTWARE Distributors	: **EIDERSOFT, Hall Farm, North Ockenden, Upminster, Essex. Tel: 0708 851099**
	T.K. COMPUTERWARE, Stone Street, North Stamford, Ashford, Kent. Tel: 0303-81-2801
UK HARDWARE Distributor	: **DS ENTERPRISES, 25 Trinity Rise, London SW2 2QP. Tel: 01-671 0209**
HARDWARE & SOFTWARE Belgium Luxemburg Netherlands	: **SIMSOFT, Guy Delforge, Jan Hamminecke Str. 39, Mariekerke, Bornem, Belgium. Tel: 052 335910**

TROUBLE

Framed as a general request to suppliers and producers to test their products more thoroughly before releasing them, the March *QL World* contained an article dealing with compatibility and quality troubles with QL software and hardware. This article is part of a new series dealing with letters received from readers making complaints about products and suppliers. I can almost see the hackles rising on some suppliers already, so I hasten to add that this is not to be a 'knocking' column.

First, a few points about the mechanism of this business. A little reading of the advertisements in *QL World* will indicate that many software titles are sold through several outlets; it is often obvious which is the original supplier. That supplier may well have only a loose connection with the program authors; programs usually are written by individuals who authorise suppliers to sell them and receive a fee on each copy sold. That arrangement causes two obvious possibilities for complaint. If the software is ordered from a supplier who, in turn, orders it from the originating supplier, there is a chance of one or other supplier being out of stock of the item. If you as a user do not receive what you ordered, you blame the supplier from which you ordered it but he may be getting bad service from his supplier.

The second point is similar; if there is a fault in the program, or it does not run properly with your system, you complain to your supplier; he may not know of the problem and has to go to his supplier, who then has to contact the author. It would be no surprise to find that he had long ago lost interest in the program, having moved to other things — possibly other computers. Much as you may be upset, threatening to sue the supplier(s) may not take you any closer to fixing your problem.

Delays in supply of products feature high on the list of complaints received but consider the other possible reasons for non-arrival of your new toy. If you ordered something in December, there is a good chance British Gas had a large hand in any delivery delay, because it chose the peak period of Christmas mail to float its shares. Orders sent from overseas can take weeks or months to arrive at their destination under normal circumstances and the despatched goods can take just as long to reach you. Did you put the correct post code on your letter? The Post Office gives priority to mail with the code.

Tread warily when considering buying a new product, because it may not exist. There is nothing like visiting a Microfair and asking for a demonstration of the advertised goods. I can think immediately of three hardware items which sounded ideal for me but were not working properly when advertised for sale. Nor were two of them ever put into proper production and the other may finish the same way.

Even mundane items, such as cartridges and discs, can hold perils for the unwary buyer. I am advised that used cartridges may be a better bet than new ones, because some of the latter contain tape which did not meet the standard required for selling with Psion software.

Three years after the QL came on to

J. McGreehin asked where he can obtain 215mm-wide paper for the Serial 8056 printer as sold by Dixons, because he finds the 210mm-wide type sold by Boots to be unsatisfactory. The reply from Dixons Customer Service is that the complaint had not been received previously and it believes the 210mm paper to be the correct type to use.

It has sold thousands of the printers and is continuing to supply the 210mm paper. It may be that McGreehin has a problem with the printer; if other readers have experienced the same difficulty we would be interested to hear about it in more detail.

The same reader asked if others had any problems formatting new Microdrive cartridges. He bought two four-packs and found four cartridges would not format and two more would give only 215 sectors. As with the QL, there must be old cartridges around, perhaps unused but not up to later production standards.

It is unlikely that a complete pack would be so bad as not to be formattable at all. Even if existing cartridges format and are usable, there must be the suspicion that one or both drives are not working as well as they should. With good drives and cartridges, formatting should produce 214/220 sectors or better. So far as the drive performance is concerned, the right-hand figure is the important one, because that is the total number of sectors found on the cartridge, whereas the left-hand figure is the number of sectors which are good, i.e., usuable for data.

I have just seen 227/229, formatting a cartridge bought with a Psion program already on it, but that is the highest figure I have had; 218/220 is a reasonable minimum to expect from good drives and cartridges. If most cartridges give less than that, the drives need tweaking; the drive rollers can be cleaned with a non-aggressive cleaner, such as methylated spirit and re-fitted the other way up, then pushed down until the clearance from the plastic collar below is about 10-thousandths of an inch.

R. Handford wrote about slow response from Aladdink, which re-inks used printer ribbons. The reply is that his order was received on the eleventh of a month and despatched at the end of that month. The delay was largely due to the fact that the ribbon — DMP 2000 printer — was left a week after re-inking to ensure that the ink penetrated fully; that is not necessarily required with other types of ribbon. Aladdink asks that any customer experiencing delay makes direct contact, preferably by telephone but not after 10pm.

I. J. Bottomley needs a copy of the disc drive operating system for Quest Executive Series drives. Unfortunately, we can offer no advice other than to join Quanta and ask for help. Quest did not answer our request for information but we received a reply from IT Marketing Ltd, which apparently bought the Quest Business Software division. It advises that it cannot provide help with any QL-related difficulties, other than to offer 50 per cent discount to buyers of QL Cash Trader who are upgrading to the IBM or Amstrad version.

SHOOTER

the scene we still see letters asking about service from Sinclair. While Sinclair may be returning to the computer market, it has not accepted responsibility for the QL since selling the rights to Amstrad last year, and there is no point in trying to contact the Sinclair address given on guarantee cards, which should have been taken out of the packages months ago.

The dealer who sold you the machine should deal with service; if he is no longer in business, or you bought by mail order, contact the company noted below. It handles in-guarantee service on some QLs and also has a fixed charge of £39.95 including VAT and P&P for out-of-guarantee repairs.

Likewise with Psion Software; although it is still involved in the computer business, it is unlikely it will want to deal with queries on the QL quartet. Eidersoft has spoken of providing support for Psion programs but only if you join its Support Scheme. Reading through back numbers of *QL User/World* and *Quanta* is as good a source of help as any on this subject.

Many QLs bought in the last year or two will not have been new. They will have been returned as faulty by a previous owner and then refurbished.

There were two QLs in a shop near to me in late February marked "D06" and "D13"; the hardware modification level reached at least D17 before production ceased, so those two machines cannot be new; in any case they are in plain brown boxes, not the original Sinclair ones. I think both machines were manufactured prior to early 1985.

Checking whether or not they have been updated would be an uncertain business; there should be a sticker underneath giving the modified hardware level, e.g., just "D14" and typing-in <PRINT VER$> and pressing Enter should give the message "JM" or "JS" on the screen. Any other message e.g., "AH" or "FB" would be unacceptable, as that would indicate the operating system/SuperBasic in the machine was a version with significant problems.

Formatting a good cartridge should produce 214/220 sectors or better in both drives; much less would suggest the drives are not modified to later standards.

When a new program fails to run on your machine, do not think automatically you have bought a dud. There are many combinations of hardware and software of which one can think with the QL and they do not all welcome new programs. Failure of a program to be read from a Microdrive usually means a bad drive or cartridge and you should be aware whether or not your drives are working properly.

It is possible for a cartridge to read on one drive and not on another; you cannot say in that case that the cartridge is bad but it may still be necessary for you to request a replacement. Try getting a directory of the cartridge from the other drive — the one not used to run the program — and then try to Copy one of its files to the screen; if both work the program drive is not at its best, even though it will read other programs.

One final point before answering some letters. Bear in mind the time delays in posting; your order to a supplier may take a week or so to arrive.

That is rather a sad story but not unusual, remember the Quest advertising about two years ago? The disc drives proved to be very big, very expensive and presumably not too convenient to use with the operating system on cartridge. If any reader can supply a copy of the necessary files, write to us and we will pass the letter to Bottomley.

Another reader raised a problem which he indicated could be widespread — software not being in the package bought. In this case, the supplier had taken considerable trouble to send the missing item but had been handicapped by not being able to contact the company from which he had bought the package. Lack of response to telephone calls is something with which most of us are likely to be familiar but we may not be aware people in the trade suffer the same treatment. To circumvent this problem, the only policy is to keep large stocks, which is an expensive proposition.

It is worth bearing in mind that the cost of QL software is low compared to that for office computers, even though the features may be comparable, and a one-man business supplying software bought from another supplier stands to lose money if he has to spend large amounts of time and petrol chasing missing items. That is not to say it is not his responsibility to ensure the product sold is of merchantable quality, though like it or not, it is his problem if something is missing from orders he despatches.

The last point led to another, that of defective goods. The return rate for software seems to vary from less than one percent to more like 30 percent and the same applies to some hardware.

Sinclair set a very bad standard from the start. Although I read that the return rate was less than five percent, I would think it was more likely to have been 25 percent. Would anybody, like to hazard a guess at to how many of the QLs sold during the last year were new in the full sense?

Such a rate of faults is much too high; even one percent is not good. That is more true with software, since duplicating programs is not a complicated process leaving aside the separate and all-too-frequent incidence of bugs in programs.

Service:
Verran Micro Maintenance
Unit 2h & 2j
Albany Park Industrial Estate
Frimley Road
Frimley
Surrey GU15 2PL.
Tel: 0276 66266

Quanta (users' group):
Brian Pain
24 Oxford Street
Stony Stratford
Milton Keynes MK11 1JU.
Tel: 0908 564271

Cash trader:
IT Marketing Ltd
Berry Head Road
Brixham
Devon TQ5 9AA.
Tel: 08045 6566

SECTOR SOFTWARE

★ 0772 454328 ★

SEND US YOUR ADDRESS IF YOU WISH TO RECEIVE OUR FREE PRODUCT GUIDE/PRICE LIST.

TOUCH TYPIST

Don't even think about buying a replacement keyboard until you know how to use the one you already have. Why type slowly when you can be typing at professional speeds letters, basic programs, data etc can all be entered in a fraction of the time now taken by learning to type correctly. Did you know that it is harder to type with two fingers than it is to type correctly. Touch typist is the fastest typing tutor available for the Sinclair QL. It will teach you to type at up to 211 wpm. It is 100% machine code and has a keyboard tutorial to show you the keyboard basics, 3 teaching modes, adjustable speed and accuracy targets, very fast interactive keyboard, your results can be displayed on a graph and be saved to drive for future additions, the full lesson editor will allow you to alter and customise any or all of the 200 lessons which can then be save to drive to create a library of custom lesson sets, also included is a reward option where if selected providing you meet the requirements you specify you will be given a 100% Machine Code arcade game as a reward for your progress Touch Typist will run from disk, microdrive or ramdisk and is supplied on microdrive for only **£12.00.**

THIS IS WHAT *QL WORLD* HAD TO SAY ABOUT THE PROGRAM

"Succeeding admirably as a serious course intended for beginners and experienced typists alike, Touch Typist is a well presented useful utility which includes the professional polish of good quality software"—*QL WORLD*, July 1986.

VARIOUS

QL DUSTCOVER .....**£5.00** MICRODRIVE LABELS ON TRACTOR FEED .....**£3.50** per 100
20 MICRODRIVES IN TRANSFORM STORAGE BOX **£37.00**
MIRACLE 512K EXPANDERAM WITH THROUGHPUT EXPANDS YOUR QL TO 640K ...**£115.00**
INTERNAL 640K MEMORY UPGRADE LEAVES YOUR EXPANSION PORT FREE **£110.00**
MIRACLE AUTODIAL MODEM.....**£45.00** ASTRACOM 1000 MODEM **£199.00**
MICROVITEC 1451DD3 DEDICATED MONITOR (SUPERB GRAPHIC DISPLAY).....**£260.00**

MICRODRIVE CARTRIDGES £1.00 each

ONCE USED MICRODRIVE CARTRIDGES. THESE CARTRIDGES HAVE BEEN USED TO RECORD A COMMERCIAL PROGRAM, AND THEN NEVER BEEN USED. THOUSANDS HAVE BEEN SOLD AS BLANK CARTRIDGES. THIS IS A LIMITED OFFER AS WE ARE SELLING THEM AS FAST A WE CAN BUY THEM.

£1.00 EACH OR £45.00 FOR 50

TASK MASTER

Truly multitask all your psion programs and others you require, allow programs to run in the background whilst you work on others, built-in calculator, notepad, file handling and copying utilities, directories display file sizes, rename files, selective copying deleting etc, calculator transfers results to program that call it background printing etc, supplied on microdrive...**£25.00**

QL SPARE PARTS

QL TEST SOFTWARE + RS232 LOOPBACK LEAD TESTS ALL THE MAJOR FUNCTIONS OF THE COMPUTER, EG SOUND, COLOUR, KEYS, RS232 MICRODRIVE ETC. AS USED BY REPAIR COMPANIES **£14.00**

KEYBOARD UPPER CASE INCLUDES, KEYS AND SPACEBAR.....£16.00
KEYBOARD LOWER CASE.....£5.00
KEYBOARD MEMBRANE.....£5.00
BUBBLE MAT.....£3.00
BACK PLATE.....3.00
RS232 PRINTER LEAD.....£5.00
JS ROM SET.....£28.00
ZX8301 ULA.....£12.00
ZX8302 ULA.....£13.00
RAM 4164 150ns.....£5.00

SERVICE MANUAL
THIS IS THE MOST UP-TO-DATE BOOK FOR REPAIRING THE QL. IT CONTAINS ALL CIRCUIT DIAGRAMS, FAULTFINDING CHARTS AND OSCILLOSCOPE DISPLAYS TO ENABLE YOU TO REPAIR YOUR OWN QL OR UNDERSTAND HOW IT WORKS £25.00

SOFTWARE

TOUCH TYPIST.....£12.00
TASK MASTER.....£25.00
OFLASH RAMDISK + TOOLKIT ON MICRODRIVE.....£19.00
SIGN DESIGNER.....£16.00
CARTRIDGE DOCTOR.....£13.00
EYEQ.....£29.00
ARCHIVER.....£17.00
TURBO.....£84.00
THE EDITOR (DP).....£25.00
PROJECT PLANNER.....£30.00
QLIBERATOR.....£70.00
FORTH.....£34.00
MAILMERGE.....£10.00
DECISION MAKER.....£30.00
GARDNER.....£20.00
TOOLKIT 2 (EPROM).....£34.00
TECHNIQL.....£49.00
MEDIA MANAGER.....£40.00
THE QUILL.....£23.00
FRONT PAGE.....£23.00
SCRABBLE.....£15.00
ARCHIVIST.....£30.00
GST MACRO ASS.....£43.00
FINANCE MANAGER.....£19.00
QFLASH ON EPROM.....£24.00
KEYDEFINE.....£10.00
TALENT WORKBENCH.....£25.00
SUPERCHARGE.....£49.00
PSION CHESS.....£17.00
BETTER BASIC (DP).....£20.00
GST ASSEMBLER.....£26.00
HOME FINANCE.....£20.00
REVERSI.....£10.00

WE HAVE A LARGER SELECTION OF PARTS THAN SHOWN HERE. PLEASE RING FOR MORE DETAILS OR IF YOU HAVE ANY UNUSUAL REQUIREMENTS THEN GIVE US A TRY.

SECTOR SOFTWARE

39 WRAY CRESCENT, ULNES WALTON, LEYLAND, LANCASHIRE PR5 3NA.
TEL: 0772 454328 PRESTEL MAILBOX 772454328

ACCESS AND VISA CARDS WELCOME
PLEASE NOTE: ALL PRICES INCLUDE VAT & P/P.

Access VISA

David Batty

TASK MASTER

THE "ROLLS ROYCE" OF MULTI TASKING MOTORS ON.

★ ★ ★ NEW ★ ★ ★

NEW. Optional saving of screens
NEW. Optional saving of basic screen
NEW. Auto screen redraw
NEW. Flexible adding of programs to system
NEW. Calculator remembers last number
NEW. Calculator with "raise to power of"
NEW. Files module continuously updates device memory
NEW. Reset module with open file protection
NEW. Protection now by copyright only
NEW. Available on disc
NEW. Selective loading of required modules
NEW. Command file generation module
NEW. Notepad module with many features inc word wrap
NEW. Fully ice compatible
NEW. Compatible with Psientific Keydefine
NEW. 8 programs on entry screen
AND NOW WITH FULL DUPLICATE CODE SHARING
This means for example that you can have up to 12 spreadsheets in memory AND STILL HAVE 230K FREE!!!

THE NEW COMMAND FILE MODULE allows you to EASILY Create command files that PUT THE MACHINE INTO "AUTO PILOT".
The possibilities are limited only by your imagination. ANY SERIES OF OPERATIONS THAT YOU CAN DO WITHIN THE TASKMASTER SYSTEM WILL BE FAITHFULLY REPRODUCED BY SWITCHING ON A COMMAND FILE.

THE OLD TASKMASTER WAS REVIEWED AS THE BEST AVAILABLE.

THE NEW TASKMASTER IS A MAJOR BREAKTHROUGH FOR THE SERIOUS QL USER WITH AN EXPANDED MACHINE.

PLEASE COMPARE TASKMASTER WITH ALL THE OTHER MULTI TASKING PROGRAMS. THEN BUY IT!

PRICE STILL £25.00

QL *Strip* Poker

by Stefan Schmidt

This could make playing cards with a computer a somewhat embarrassing experience!

Denise, your attractive opponent, will always exchange an item of clothing for £200 when she has lost all her stake money — so you, in all fairness, should do the same. However, Denise plays cards rather well.....

£14.95 (+ 50p p&p)

Oxford Trivia

A challenging quiz game for all the family, designed to test your knowledge to the utmost. It's colourful and fun to play.

You can choose to answer questions on WORLD FACTS, FILMS, POP MUSIC or SPORT. Each category contains between 300-400 questions. The better you are, the faster the game!

Further sets of questions can be added as you require — over 16,000 have been assembled!

£17.95 (+ 50p p&p) (two cartridges)

WHAT'S NEW from TALENT

You'll find full details about our great new range of QL games in the TALENT Mail Order Catalogue. Phone or write for your ***FREE*** *copy today!*

★ ★ ★

Save Money!!

when you join the Talent Mail Order Club. Full details in our catalogue!!

TALENT COMPUTER SYSTEMS

Curran Building
101 St James Road, Glasgow G4 0NS.
ACCESS & VISA welcomed
041-552 2128

NEMESIS

by Paul Brittain

Track down and catch the most wanted and dangerous man in all the Cosmos, a man known only as Nemesis.

An exciting text adventure which will give enthusiasts a good run for their money. Rich in atmosphere and description, chockful of incident and excitement, it will take many moons to solve.

£14.95 (+ 50p p&p)

JUNGLE EDDI

by Stefan Kuhne

Swing your perilous way through the jungle, avoiding crocodiles, snakes and other venomous beasties. Even Tarzan would find it tough going!

A fast addictive game. Its brilliant graphics and imaginative animation make it a pleasure to play.

£14.95 (+ 50p p&p)

MPC SOFTWARE

SOFTWARE

Leisure Software

Bounder	£9.00
Bridge Player	£12.00
Bridge Player II	£19.00
Cavern	£12.00
Chess	£17.00
Cuthbert in Space	£10.00
Eidersoft 3 pack	£15.00
Fictionary	£10.00
Flight	£17.00
Jabber	£9.00
Jungle Eddi	£13.50
Karate	£13.50
King	£10.00
Lands of Havoc	£10.00
Lost Pharaoh	£13.00
Matchpoint	£13.00
Meteor Storm	£10.00
Mr. Smith	£10.00
Othello 3D	£12.00
Oxford Trivia	£16.00
Quboids	£9.00
Scrabble	£13.50
Squadrons	£14.50
Startrek	£4.00
Steve Davis Snooker	£13.00
Stoneraider II	£10.00
Strip Poker	£13.50
Super Croupier	£13.50
Vroom	£13.50
Wanderer	£17.00

Business

CAD QL	PHONE
Cash Trader (mvd or disc)	£55.00
Concept 3D	£32.00
Concept 3D Demo	£2.00
Decision Maker	£32.00
Front Page	£21.00
Home Finance	£20.00
PCB Designer 1	£95.00
PCB Designer 2	£95.00
Project Planner	£32.00
QSpell	£23.00
QSpell Disc	£27.00
Sideways	£18.00
Taskmaster	£23.00
Technikit	£24.00
Techniql	£45.00
Transact (Bookkeeping)	£20.00
Viewpoint	£17.00
Viewpoint Disc	£22.00

Languages

Assembler (Metacomco)	£35.00
Assembler Workbench	£21.00
Assembler (GST)	£22.00
C	£80.00
Forth (Computer 1)	£30.00
Fortran 77 (Prospero)	95.00
Macro Assembler (GST)	£37.00
Pascal (Metacomco)	£72.00
Pascal (Computer 1)	£30.00
Pascal (Prospero)	£95.00

Utilities

Artice	£12.00
BASIC-ally	£26.00
Cartridge Doctor	£13.50
Choice	£15.00
Copier	£12.00
Font Designer	£5.00
Graphic Toolkit	£13.50
Gardener	£20.00
ICE	£26.00
ICIcle	£18.00
ICE Toolkit	£10.00
Liberator	£69.00
Nucleon	£17.00
Q-Flash + Toolkit	£19.00
QFlash ROM	£23.00
QIMP	£35.00
QL Mon	£14.00
QL Paint (Graphiql+)	£22.00
QL Peintre	£13.50
QL Toolset	£18.00
RAM Disc	£14.00
Shrink Program	£5.00
Sprite Designer	£8.00
Techniql	£45.00
Touch Typist	£11.00

Adventures

Mortville Manor	£17.00
Nemesis	£13.50
Nemesis + Music	£17.00
West	£13.50
Zkul	£13.50

Computer One Pascal

Computer One Pascal compiler is a full implementation of Pascal, close to ISO, for the QL. Computer One FORTH programmes run on average 15 times faster than Superbasic.
Features include:
★Full Screen Editor. ★Graphic & Sound Extensions. ★Example Programmes. ★100 Page Manual.
★Easy to use Command Menus. ★Produces Stand Alone Programs.
Special Offer Price £30

BOOKS

Sinclair QL Adventures	£3.00
Artificial Intelligence on the QL	£3.00
Maths on the QL	£3.50
Developing Applications on the Sinclair QL	£3.00
Simulation Techniques on the Sinclair QL	£3.00
Quill, Easel, Archive & Abacus on the QL	£3.00
Inside the Sinclair QL (Hardware)	£6.00
Desk-top Computing with the Sinclair QL	£3.00
Word Processing with the Sinclair QL	£3.00
Database Management on the Sinclair QL	£4.00
Advanced Programming with the Sinclair QL	£4.00
Making the Most of the Sinclair QL	£3.00
Using Graphics on the Sinclair QL	£7.95
Introduction to Superbasic on the Sinclair QL	£3.50
Profiting from the QL (Abacus)	£4.00
QL Superbasic	PHONE
QL Computing	PHONE
QL Advanced User Guide (QDOS)	£14.50
Quantum Theory	£4.00
QL Quill	£4.50
QL Easel	£4.50
Sinclair QDOS Companion	£6.95
Assembly Language Programming on the QL	PHONE
QL Service Manual (circuit diagram etc.)	£19.95
Hackers Handbook	£4.00
Creating Adventure Programmes on your Computer	£2.50
How to Computerise Your Business Sucessfully	£2.50
QL Handbook	£5.95
QL Compendium	£5.95
Exploring Artificial Intelligence on the QL	£3.50
Abacus Users Reference Manual	£7.00
Quill Users Reference Manual	£7.00
QL Technical Guide	£19.95
Computer Art & Graphics	£9.00
IBM PC Users Guide	£4.50
Xenix Users Handbook	£5.00
MS-DOS, an Introduction	£5.00

Sinclair QDOS Companion

The QDOS Companion, by Andrew Pennell, one of the most prolific authors on the QL, is essential reading if you are interested in programming the QL in Machine Code. It describes all the functions of QDOS, and gives details of all the TRAPs, and VECTOR calls. It includes details on how to access the keyboard, screen, serial ports etc. from machine code, how to communicate with the 8049 co-processor, and how to write multi-tasking programmes and lots more. £6.95

QL Service Manual

The QL Service Manual is the book issued by Sinclair Research to QL repair companies, and contains all you need to know about the QL Hardware. It has full circuit diagrams including the microdrives, details on various chips and their functions, block diagrams, fault finding and lots more £19.95

Special Book Offer

Get the following 3 books by Glentop Publishing at less than ⅓ of their original cost:

Archive, Quill & Easel Users Reference Manual
Now only £12.50
(RRP £14.95 each)

7 Book Pack

The following seven books from the Hutchinson QL range at less than a third of their original price (over £50).

Word Processing on the QL
Introduction to Superbasic on the QL
Database Management on the QL
Profiting from the QL
Desk top computing on the QL
Making the Most of the QL
Advanced Programming on the QL

All 7 now only £16

Special offer. Hurry while stocks last.

HARDWARE

Printers

Citizen 120D
120CPS draft, 25 CPS NLQ £210

Citizen MSP20
200 CPS draft, 50 CPS NLQ £450

Colour Printers
& Laser Printers ..... PHONE

Ribbons £5 each.

All printers come fitted with both friction & tractor feed.
All printers have all the relevant interfaces and leads included, and carry a 2 year guarantee.
Sample printouts available.

Joysticks

Joystick Adaptor	£4.50
Arcade	£19.00
Elite	£13.00
Micro Ace	£15.00
Micro Pro	£15.00
Cheetah 125	£9.00
Pro Ace	£9.00
Pro 9000	£18.00
Professional Standard	£15.00
Wiz Card Joycard	£8.00

Peripherals

Centronics Printer Interface	£20.00
Serial Cable	£7.00
QL Computer & Software	£145.00
Repaired QL	PHONE
Eidersoft Mouse & ICE	£65.00
Microdrive Cartridges	£1.80
4 Microdrive Cartridges in Wallet	£7.50
Joystick Adaptor	£4.50
Miracle Modem	£49.00
Monitor Leads	PHONE
Sound & Speech Boards	PHONE

SPEM Video Digitizer
PHONE for details.

Postage Rates:

UK: £1 on orders under £10.
Free for orders over £10.
Europe: £1 per book ordered.
Outside Europe: POA.

Disc products

Cumana Disc Interface	£85.00
Interface & Single drive	£200.00
Interface & Dual drive	£300.00
10 × 3.5″ discettes (Guaranteed)	£25.00
10 × 3.5″ discette box	£4.00
40 × 3.5″ lockable disc storage box	£13.00
80 × 3.5″ lockable disc storage box	£18.00
3.5″ disc head cleaner	£8.00
3″ drives	Phone for very low price

Prices quoted for 3.5″ systems.

Special Offer: Buy a disc system and get as many discettes as you want at only £2 each!!!

Memory Products

Miracle Expanderam 512	£90.00
Internal 512K Memory Upgrade Kit	£100.00
Internal 512K Memory Upgrade fitted	PHONE
RAM disc software	£14.00
Q-Flash RAM disc	£18.00
Talent RAM Disc & Spooler	£9.00
Memory 'Shrink' program	£5.00

Miracle Expanderams are compatible with most disc systems, and cause some QL software to run up to 30% faster.

All prices correct at the time of going to press. E&OE.

MPC SOFTWARE, 72 Julian Road, West Bridgford, Nottingham NG2 5AN.
Tel: (0602) 820106

T·U·R·B·O takes the lead.

The Digital Precision team has been labouring long and hard in the pits to produce Turbo, a compiler which looks set to take all the prizes for speed. James Lucy is the man in pole position.

After a long wait *Turbo* from Digital Precision has finally arrived. Turbo is a compiler which transforms a slow-running, slow-loading SuperBasic program into fast machine code. You have seen it before with *Supercharge*, you have seen an alternative approach with *Q_Liberator*, and now Turbo has entered the market with a host of claimed advantages but at a cost which approaches the current new price of the QL. The price of £85 means that for most people it cannot be a casual purchase and you will need a serious reason for buying it.

Turbo is on two Microdrive cartridges or a single disc and is accompanied by an enormous manual. Among the many files are two back-up programs and the first step is to copy everything to spare cartridges or discs. It is a simple process because the program is not copy-protected, although potential pirates should know that their identity is coded into the program.

The crash course — not a prophetic term, it is hoped — in the first chapter of the manual shows you how to get started as quickly as possible; very soon the supplied demonstration program graphics or prime numbers, so familiar to Supercharge owners, will be filling the screen but many questions about the many options on the Turbo front-panel will remain unanswered.

Turbo operates on the currently-loaded Basic program. Typing 'Charge', one of the Super Basic extensions provided by the Turbo Toolkit, loads and runs the first phase of the compiler, the parser. The Turbo front panel will appear, showing a set of defaults for such things as the filename of the code to be produced and the destination for the listing.

Each default may be changed, if required, and lasting changes can be made using a supplied configuring program. If all is well through the two passes over the program made by the parser, the second, code-generating, phase will run automatically, multi-tasking with SuperBasic while completing the compilation.

Hot key

The process is rapid and can be made even faster if sufficient RAM is available to make Turbo resident; in this mode Turbo is ready for use by pressing a hot-key combination of your choice.

Supercharge users who enjoyed the challenge of trying to write programs which made pretty patterns out of the screen memory during compilation will find that pleasure denied them, since Turbo uses buffer RAM and, if limited RAM is available, a temporary file for working storage.

The Turbo front panel deserves a little more comment, because it is one of the means by which the user interacts with Turbo, the other being by compiler commands embedded in the program being compiled, and because it is a neat solution to the problem of obtaining a good deal of information from the user without asking a repetitive sequence of questions.

It is described in the manual as a 'finite-state automaton' which, in practice, seems to mean that your route round the panel using the cursor keys is defined, and that questions which do not apply because of selections made elsewhere need not and cannot be answered. Whatever name Freddy Vaccha, the Digital Precision answer to Philippe Kahn of Borland, chooses to give it, the front panel is a vast improvement on Supercharge and in any case the Supercharge approach would have been inadequate with all the extra Turbo options.

Speed is fundamental in computing. All the cleverness of a computer arises from its ability to do trivially simple things very quickly, so it could be said that the faster it works the cleverer it is. SuperBasic is slow but it is a very high-level language with a great deal going on behind the scenes; much can be made to happen with just a few program lines.

The merit of a SuperBasic compiler must be measured with strong emphasis on its ability to maximise the speed of execution of the compiled program, providing that severe restrictions are not placed on the content of the source

SuperBasic and that the compilation process is not unreasonably slow.

Turbo is the fastest SuperBasic compiler so far, both in terms of its speed of compilation and in the speed of the compiled code produced. When you consider that Turbo has been used to compile itself, it is interesting to reflect on the effect of improved object code execution speed on the compilation time; think on it if you have several hours to spare and plenty of stack space.

While any delay is longer than desirable, Turbo compilation time is impressively shorter; the parser seems almost as fast as the tokenisation process carried-out by the interpreter when loading a Basic program from storage and the code generator invariably runs faster than the parser.

Despite the fact that Turbo was running in slower internal memory, a 60-line program was compiled in less than 30 seconds and a 600-line program took less than four minutes. The precise timings depend on the type of optimisation chosen for the compilation, whether Turbo is resident or must be loaded from Microdrive, and the speed of the destination report device — using a RAM disc is best. All types of high-level language compilers take their time and, considering that SuperBasic was not designed with compilation in mind, the performance of Turbo is commendable.

Fine tuning

In keeping with the comments about speed in the compiled code, Digital Precision has taken the problem by the throat and given it a good shake. The biggest section of the manual — 25 pages — is devoted to tuning Turbo for top performance. A number of optimisations are provided, the simplest being to select the 'speed' option on the front panel to generate fast, in-line code for the entire program. That can have dire consequences for program size, however, and is intended only for very short programs.

In the majority of cases just a few lines of a program, often nested loops, consume most of the running time and it is those which should be rendered in in-line code. That is possible using the 'rem' option on the front panel and, with judicious placement of the REM + and REM – compiler directives, in the SuperBasic program. A utility included with Turbo Toolkit allows programs to be analysed for bottle-necks and other candidate areas for in-line code.

Integer arithmetic is slower than floating point under the interpreter and integer control variables for loops cannot even be slipped past the SuperBasic syntax checker except on pre-JM ROMs. That problem is solved by a toolkit command IMPLICIT%, which tells Turbo to treat specified variables as integers, even though their names do not end in the % sign.

Dramatic

In that way Turbo can generate much faster code for integer operations and loops and yet the program remains acceptable to the interpreter. Where integer loop control variables are also being used to index into arrays the speed increase can be dramatic, as demonstrated by the *Sieve of Eratosthenes* program shown in the table.

Considerable improvements in string-handling are claimed over both the interpreter and Supercharge and the amount of run-time checking which goes on is in some cases reduced in comparison to Supercharge. All this leads to major increases in speed although, as always, there is difficulty in obtaining true comparisons. Benchmarks, which are typically very short, fail to reflect the very significant benefits for large programs, but large programs which perhaps spend a good deal of time wandering round the ROM floating point routines or writing to the screen may also be unrepresentative.

Make of the comparison table what you will, although it should be said that bigger programs usually go down in size rather than the increase shown in the table. Perhaps the proof of the performance pudding may be found in Chas Dillon's *Editor* program, also published by Digital Precision. Editor is particularly fast, despite being written in Turbocharged SuperBasic rather than some other language — C for instance — which might be thought more appropriate for coding a text editor.

Owners of unexpanded machines may find problems with one of the design decisions — the parser occupies approximately 60K and must be loaded alongside the program to be compiled, limiting that to about 22K loaded; larger programs may be compiled in separate portions consisting of groups of procedures using the supplied utility Make_Modules but this is rather tedious — extra RAM is highly desirable. Q_Liberator is much more convenient in this respect.

Bench mark tests	Compilation time(s)	Running time(s)	Code Size
1. Recursive, string handling			
Turbo	28	20	9,150
Supercharge	35	30	10,200
Q_Liberator	35	31	8,166
SuperBasic	—	83	1,465
2. Composer — see Microdrive Exchange			
Turbo	201	27[2]	34K
SuperCharge	—	—	—
Q_Liberator	405	33[2]	33K
SuperBasic	—	61[2]	25K
3. Sieve of Eratosthenes			
Turbo	8	9[1]	6,928
SuperCharge	18	24	7,600
Q_Liberator	19	30	8,790
SuperBasic	—	154	321

Notes. 1. Where possible, Q_Liberator and Supercharge compiled the same program. The Turbo IMPLICIT % feature was used for integer FOR . . . END FOR loops.
2. Running time for Composer is time to load and display 100 notes.
3. Compilation times include loading Compiler overlays from 3½in. disc.
4. All compilation and running on 640K QL with slow internal RAM.
5. SuperBasic program size refers to file size. Compiled program sizes do not include dataspace.
6. Important. The figures in the table are accurate but cannot begin to cover all possibilities. Programs written with compilation in mind can display much greater running speed improvements.

The so-called help facility, obtained by pressing F1 in the front panel, is so limited it seems a waste of time to poll the key; ideally pressing F1 should bring up help on the currently-highlighted control on the front panel.

Turbo contains a number of features which allow the advanced user to avoid many of the restrictions of SuperBasic. The advantages of Implicit% in creating integer FOR loops have already been mentioned and Implicit$ fixes the curious SuperBasic shortcoming of being unable to SELECT ON a string. So-called rubber arrays allow existing arrays to be re-dimensioned larger or smaller while retaining as much data in the array as will fit, and sample SuperBasic routines are provided to implement virtual arrays. They exist on Microdrive or disc rather than in memory, although spare memory is used for buffering to reduce drive access.

Error-trapping, vital to the professional software developer, is implemented in full regardless of the QL ROM version in use and includes such features as Retry Here. The snag, as with several of the advanced facilities, is that they cannot properly be tested in interpreted code.

. Now for the really mind-bending bit. Turbo has a link-loader which can connect separately-compiled modules, provided that global and external variable, procedure and function names — and other data — are declared at the time of compilation. That means that tasks can share procedures and functions and can even use the same variables, although multitasking is suspended temporarily when writing to variables, for obvious reasons.

Tasks may also communicate via pipes and so a complex 'net' of jobs may be set up; that should provide food for thought. In case you are wondering, modules are not in Sinclair Relocatable Object File Format so you can forget about links to C, Pascal *et al.*

Fast load

Finally on speed, compiled programs load very muich faster than their interpreted counterparts; in the case of the *Composer* program mentioned in the table the machine code loads some 20 times faster, despite the code size showing an increase on compilation rather than a decrease.

Digital Precision is firm in its claims of significant size reductions in the compiled code. That, of course, does not apply for small SuperBasic programs, because there is a significant run-time overhead and, as can be seen from the table, it does not apply for the program Composer, but if you are compiling most large SuperBasic programs the reduction will be worthwhile.

Two related optimisations for size are provided which, like Supercharge, use short 16-bit addressing for jumps, thus limiting code size to 64K. If other optimisations are in use, Turbo casts aside the Supercharge 64K limit by using 32-bit addressing. That means finished code could be many times larger than would fit in a fully-expanded QL.

One of the problems with Supercharge was its fussiness about program style. Turbo is much more tolerant and uses many of the ideas from the DP Better Basic 'expert system' to make automatic corrections to a program which is not to its taste. It is arguable whether all the interpreter features should be supported, warts and all, or whether a more pedantic view should be taken; Turbo's competitor Q_Liberator tends to the former view, Supercharge the latter, and Turbo is somewhere in between.

In practice, provided the real nasties are avoided, Turbo compiles most programs without many changes and is certainly a vast improvement on Supercharge, while still not being so tolerant as Q_Liberator. Turbo does not support computer line references or calculations in data but, as compensation, ON . . . GOSUB may be to a procedure name rather than a line number and a number of interpreter bugs are fixed.

For people obsessed with money and precision, like accountants, Turbo displays numbers to a maximum of nine digits of precision, rather than the seven offered by the interpreter.

Bug free

No bugs were noted in the course of the review, despite the fact that a preview copy of Turbo was in use. There will certainly be bugs, as there are in any program, but they did not manifest themselves when compiling and running reasonably straightforward programs.

DP calls the manual an encyclopedia — and with some justification. It is comprehensive and, most important, well-indexed so that any information can be found quickly, although in some cases it will be necessary to wade through a few words too many. Since the manual is so enormous and space-consuming and the on-screen help is so limited it would have been pleasant to have a quick reference or beginners' guide in the form of a pamphlet or card which could be kept beside the computer.

Having, one assumes, used up the world's supply of brilliant orange paper on previous epics, DP has turned to green for the encyclopedia which, in conjunction with daisywheel print, is mercifully legible and even matches the on-screen colour of the Turbo front panel.

Previously I may have damned some Digital Precision products with faint praise. Turbo, however, is an excellent program, one of the best available for the QL. It is a great advance on Supercharge, both for the tyro whose programming style perhaps leaves something be desired and for the expert who can utilise features like the link-loading and procedure sharing.

New era

The only competitor, Q_Liberator, is greatly-improved since the review in October, much faster than it was, with more features and yet still easy to use and more tolerant of poor code; it remains a worthy alternative to its more expensive but more capable rival.

In conjunction with some of the commands in Turbo Toolkit, a very worthwhile product, Turbo takes SuperBasic and the QL into a new era. We should start to see programs which are impossible in interpreted SuperBasic and unthinkable on any other small micro. There is life in the Queer Lump yet.

BYTEBACK

THE QL SPECIALIST

GAMES		ONLY
Jungle Eddie	Talent	12.50
Lost Pharoah	Talent	12.50
Chess	Psion	16.00
Match Point	Psion	12.50
Blocklands	Digital	8.50
Droidzone	Digital	8.50
Super Backgammon	Digital	11.00
Quboids	Sinclair	8.00
Bounder	Sinclair	8.00
Meteor Storm	Sinclair	8.00
QL Reversi	Sinclair	8.00
Spook	Eidersoft	9.00
Karate	Eidersoft	12.50
BJ in 3D Land	Eidersoft	7.00
BJ The Return	Eidersoft	8.00
Citadel	Eidersoft	7.00
Zapper and Eagle	Eidersoft	7.00
Mister Smith	Pyramide	10.50
Super Croupier	Pyramide	12.50
Vroom	Pyramide	12.50
Wanderer	Pyramide	17.00
Othello 3D	Pyramide	17.00
Stone Raider II	Microdeal	17.00
Flight	Microdeal	16.00
Lands of Havoc	Microdeal	16.00
King	Microdeal	12.50
Dragonhold	Rubicon	17.00
3D Slime	Datalink	11.00
Knight Flight	Realtime	12.50
Steve Davis Snooker	CDS	12.50
Scrabble	L. Genius	12.50
Hyperdrive	English	12.50
Bridge Player II	C.P. Soft	17.00
Gwendoline	Labochrome	16.00
Tank Busters	Sellasoft	12.50

ADVENTURES		ONLY
Quill System	Gilsoft	19.00
Nemesis	Talent	12.50
Zkul	Talent	12.50
West	Talent	12.50
Classic Adventures	Sinclair	8.00
Aquanaut 471	Microdeal	17.00
Mortville Manor	Pyramide	17.00
Executive Adv.	Gemini	12.50

PROGRAMMING		ONLY
Supercharge	Digital	43.00
Turbo (+ Toolkit)	Digital	72.00
Turbo Toolkit	Digital	25.00
Better Basic	Digital	21.00
Superforth	Digital	25.00
Basic-Ally	Talent	25.00
Assembler Workbench	Talent	21.00
Assembler Dev. Kit	Metacomco	34.00
Lisp Dev. Kit	Metacomco	49.00
C Dev. Kit	Metacomco	79.00
BCPL Dev. Kit	Metacomco	49.00
Pascal Dev. Kit	Metacomco	75.00

ART AND DESIGN		ONLY
Datacad QL (for Plotter)	Datakey	9.50
Viewpoint 3D	Rubicon	17.00
PCB Designer 1	Talent	85.00
PCB Designer 2	Talent	85.00
Graphical Plus	Talent	21.00
TechniQL	Talent	43.00
Technikit	Talent	21.00
Eye-Q	Digital	25.00
Super Srite Gen	Digital	25.00
Graphic Toolkit	Pyramide	12.50
Nucleon	Pyramide	17.00
QL Peintre	Pyramide	12.50
Sign Designer	D.S. Ent's	16.00
Cad Pak	Datalink	12.50
ARTice (need ICE)	Eidersoft	12.50

UTILITIES AND BUSINESS		ONLY
Qimp	Talent	34.00
Ram Disk/Spooler	Talent	8.50
Sideways	Talent	17.00
QL Toolset	Talent	17.00
Cartridge Doctor	Talent	12.50
Cosmos	Talent	12.50
Super Astrologer	Digital	21.00
Pro Astrologer	Digital	51.00
Super Media Mgr	Digital	34.00
Cart. Media Mgr	Digital	21.00
The Editor	Digital	25.00
ICE	Eidersoft	25.00
Icicle	Eidersoft	17.00
ICE Toolkit	Eidersoft	11.00
CHOice	Eidersoft	14.50
ARTice	Eidersoft	12.50
Qspell	Eidersoft	19.00
Qspell (disk)	Eidersoft	23.00
Home Finance	Sinclair	20.00
Decision Maker	Sinclair	29.00
Project Planner	Sinclair	29.00
Cash Trader	Sinclair	54.00
Touch Typist	Sector	10.00
Tasprint	Tasman	18.00
QL Multi Task	D.S. Ent's	12.50
Ram Disk	D.S. Ent's	12.50

HARDWARE	ONLY		ONLY
Joystick adaptor	4.50	4 Microdrive Cartridges	7.00
The ARCADE joystick	17.00	4 Cartridges (in wallet)	7.50
Quickshot II joystick	8.00	20 Cartridges in Transform Box	39.00
Quickshot TURBO joystick	13.00	Transform storage box	4.50
Mouse + ICE + ARTice	85.00	Miracle Expanderam 512	115.00
Mouse Mat	8.00	Miracle Centronics Interface	18.00
Miracle QL Modem	45.00	Schön QL Keyboard	52.00
Citizen 120D Ribbon	7.00	Citizen 120D printer	219.00

BARGAIN BASEMENT	ONLY
4 Game Pack (BJ in 3D Land + Citadel + Zapper + Eagle)	14.00
2 Game Pack (Bounder + Quboids) ★Limited Stocks★	14.00
2 Game Pack (Droidzone + Blocklands)	15.00

Also.....BEST PRICES ON Atari ST Range and Software! ..... Phone for prices!

ALL PRICES INCLUDE VAT AND FIRST CLASS POST
TELEPHONE (0636) 79097 FOR PERSONAL ASSISTANCE
Send Cheque/PO to:

BYTEBACK 20a SPRING GARDENS, NEWARK, NOTTS NG24 4UW

T. K. COMPUTERWARE

★ Your QL Stockist ★
Telephone: 0303-81-2801

SOFTWARE:

Archiver	18.00
Archiver (disk)	24.00
Cash Trader	60.00
Cardfile 128K	15.00
Decision Maker	35.00
Entrepreneur	35.00
Home Finance (Buzzz)	22.00
Impacct Sales Ledger	46.00
Purchase Ledger	46.00
Nominal Ledger	46.00
Impacct set above	135.00
Impacct set + Stock Cont	175.00
Sales Order	46.00
Purchase Order	46.00
Intergrated Accounts	85.00
Librarian 128K	20.00
Qspell	25.00
Quimp	40.00
Touch Typist	12.00
Copymate	13.00
Archivist	30.00
ICE Eprom	29.00
Choice	16.00
Toolkit	10.00
Artice	14.00
Icicle	15.00
ICE set above	84.00
Key Define	10.00
Sideways	20.00
Ram Disk (QfLash)	13.00
Ram Toolkit (QfLash)	10.00
Ram Disk set above (cart)	19.00
Ram set above (Eprom)	25.00
Ram set above (disk)	21.00
Mouse set (std)	70.00
Task Master	25.00
Nucleon	20.00
Super Sprite Generator	29.00
Super Toolkit 2	34.00
Front Page	23.00
Flight Simulator	17.00
The Quill (adv. writer)	23.00
P/Astrologer + Astronomer	70.00
Squadrons	16.00
Backgammon	13.00
Karate	15.00
Aquanaught	20.00
Blocklands	10.00
BJ The Return	10.00
Caverns	11.50
Droidzone	10.00
Fictionary	11.50
Hyperdrive	13.00
Knight Flight	15.00
Lost Pharaoh	15.00
Mortville Manor	20.00
Slime 3D	13.00
Jungle Eddy	15.00
Concept 3D	40.00
TechniQL	50.00
GraphiQL	21.00
QDraw	15.00
Eye Q	29.00
QL Paint (GraphiQL+)	24.00
Viewpoint	20.00
Peintre	15.00
Graphic Toolkit	15.00
Sign Designer	18.00
Better Basic	20.00
GST Macro Assembler	45.00
Prospero Pro Pascal	92.00
Pro Fortran-77	92.00
Supercharge	50.00
SuperForth	25.00
Super Media Manager	40.00
Super Media Manager (disk)	40.00
Turbo	85.00
QLiberator	70.00
Turbo Toolkit	25.00
The Editor	30.00
The Editor (Special Edition)	40.00
Metacomco C	85.00
Pascal	75.00
APL	95.00
BCPL	51.00
LISP	51.00
Talent Assembler Workbench	25.00
Cartridge Doctor	13.00
Computer One Monitor	24.00
Forth	34.00
Pascal	50.00
Ambition	30.00
QMON	20.00
Psion 2.3 software cassette	10.00
QL Multitask	15.00
Tankbusters	15.00
Chess	17.00
Bridge Player	20.00
Cosmos	14.00
Matchpoint	14.00
Scrabble	15.00
Snooker	13.00
Super Astrologer	24.00
Classic Adventures	10.00
Super Croupier	20.00
Baron Rouge	17.00
BJ in 3D	12.00
Bounder	8.50
Dragonhold	15.00
Nemesis	15.00
Dark side of the moon	16.00
Jabber	8.75
Mr Smith	15.00
Metor Storm	11.50
Quboids	9.00
Wanderer 3D	20.00
Reversi	10.00
Las Vegas	7.77

PRINTERS:

Micro Pheripherals MP165	215.00
Cannon PW 1080A & lead	279.00
Taxan KP 910 & lead	419.00
Epsom LX 86 & Interface	278.00
Quen Data d/wheel + I/F	199.00
Centronics Printer Interface	19.50
Serial printer lead	10.00
Parallel printer lead	12.50
Tractor Feed for LX 86	22.00
Centronics printer interface (US)	21.50

EXPANSION BOARDS:

512k Expanderam (Miracle)	99.00
512k Internal upgrade	99.00
512k Expanderam+Ram Disc	110.00
512k MCS board+disk I/f	199.00
Eprom expansion board	68.00

MODEMS

Modem (Miracle)	49.50
Modaptor	39.00
Tandata QCOM	89.00
Astracom 1000	199.00

DISK DRIVES:

Disk I/Face (Cummana)	86.25
Single 3.5" Drive	125.00
Dual 3.5" Drives	199.00
SQB—Qflash eprom upgrade	25.00

DISK SYSTEMS:

Single 3.5" D/D & Interface	211.00
Dual 3.5" D/D & Interface	285.00
Single D/D & 512k MCS Board	320.00
Dual D/D & 512k MCS Board	395.00

MONITORS:

Phillips 7502+lead	98.00
Phillips 7522+lead	104.00
Microvetic DO3 Colour	260.00

SOUND:

QL Talker	75.00
QL Speech Synthesiser	60.00
QL Sound	70.00

COMPUTERS:

QL JS Ver. 2.3 S/ware	169.00
Psion Organiser 32K datapack	34.95
QL 640k, JS, 2.3 S/ware	260.00
Psion Organiser 2 XP	138.00

SUNDRY:

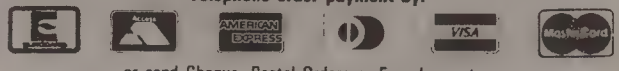
10 DS/DD disks (unbranded)	22.50
10 DS/DD disks (branded)	31.00
15 DS/DD disks (branded)	45.00
Power Clean Filter	36.00
Cartridge Storage Box	5.50
QL Service Manual	19.00
10 Microdrive cartridges	17.50
Quickshot 2 Joystick + adaptor	16.00
QL Dustcover	5.00

QL Books from £4.50 please call for titles available.

Please phone for details of other QL products in stock

★All prices are in £ and include VAT and UK mainland delivery by Post or Interlink★

Telephone order payment by:



or send Cheque, Postal Orders or Eurocheque to:

T.K. COMPUTERWARE, STONE STREET, NORTH STANFORD, ASHFORD, KENT CT25 6DF
Telex: 966676 PMFAB G

DIY TOOLKIT

If you are ready to add the second command to your DIY Toolkit Marcus Jeffery has something special — a 3D graphics command.

We are adding a new graphics command to SuperBasic. SuperBasic graphics are sophisticated for a home micro but they are only two-dimensional. So, when you want to draw that three-dimensional bar chart, you are stuck. To solve the problem, this month's algorithm will add the commands:

LINE3D [channel,] x1,y1,z1 TO x2,y2,z2

which will plot a line from the co-ordinates (x1,y1,z1) to the point (x2,y2,z2) in three-dimensional space. The three-dimensional co-ordinate system we will use is shown in figure one, where '+Z' is into the screen and '−Z' is out of the screen.

Working in three dimensions can become complicated so, to make things a little simpler, we assume a fixed eye position. Further, we take the eye position as the origin. To form a perspective view, we need to define a "vanishing point", a theoretical point at which all diminishing parallel lines meet. If you were standing on the white lines in the middle of a straight road and you looked along the road towards the horizon, the vanishing point would be where the white line and the two road edges meet.

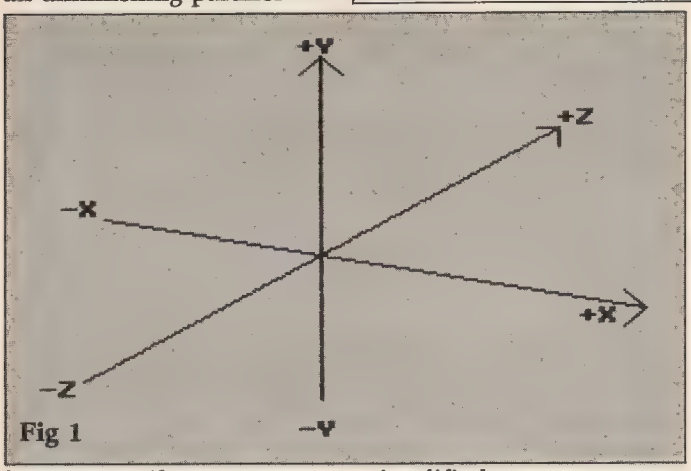


Fig 1

By taking this eye position, our perspective calculations can be simplified to:

x = X * D / Z

and: y = X * D / Z

where (X,Y,Z) are the three-dimensional co-ordinates, (x,y) are the co-ordinates to be plotted on the screen, and 'D' is the distance between the eye position and the picture plane — ie., the screen). Intuitively, the greater the value of 'Z' the further away the object and therefore the smaller the resultant 'x' and 'y' values. This implies that objects appear smaller at a distance. Figure two shows how this works for the Y-Axis; the X-Axis works in exactly the same way.

The problem now is to put all this into machine code. Figure three shows the Assembly Code listing. You will probably recognise the beginning which links the new command into the SuperBasic name table. Starting at the label LINE3D, the routine first checks to see if there is a channel number. It does so by checking the second byte of the entry for the first parameter. That will have been placed in the name table automatically by Qdos. For procedure and function parameters, the second byte of each name entry is coded in the following form:

Byte = h sss ttt

where: h — Set if parameter preceded by a hash '#'.

sss — Type of following separator:

0 = None
1 = Comma
2 = Semicolon
3 = Backslash
4 = Exclamation Mark
5 = 'TO'

ttt — Type of parameter:

0 = Null
1 = String
2 = Floating Point
3 = Integer

If the first parameter is preceded by a hash, it is fetched to the arithmetic stack as an integer using the $112 vector and the pointer to the start of the parameters in the name table — register A3 — is updated to point to the next item. Otherwise the default channel — number one — is used.

Having found the start of the channel entry in the channel table, the routine BETPARS is

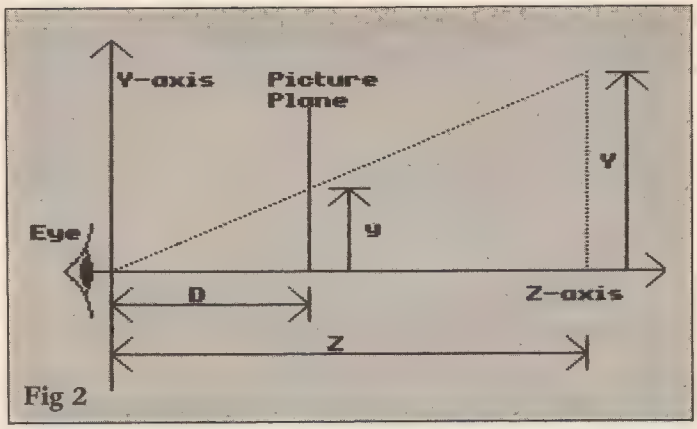


Fig 2

called to fetch the next three parameters. They should be (x1,y1,z1). They are then passed to the CALC3D routine to convert them into two-dimensional screen co-ordinates.

This routine uses a few arithmetic stack manipulations and the RI.EXEC vectored routine to perform floating point calculations. This is complex and it is suggested that you work through the routine one instruction at a time to see how it works. Remember that the stack grows downwards in memory, so the lowest address will be the Top Of the Stack (TOS) and the next address will be the Next On the Stack (NOS).

Three acronyms and Bottom of Stack (BOS) have been used in the routine. When first entered, the X, Y and Z co-ordinates will be in the stack, with X in the TOS position.

Having converted (x1,y1,z1) into (x,y) screen co-ordinates and placed them into the graphics 'STACK' area, shown at the end of the listing, the routine repeats the sequence for the remainder of the parameter list to get the finish point co-ordinates. Note that the GETPARS routine does not check for separators, so both:
LINE3D 50,50,50 TO 90,90,90
and: LINE3D 50,50,50,90,90,90 would be equally valid.

Once that is done, the 'STACK' area should hold both the start and finish line co-ordinates, converted into two-dimensional floating point screen co-ordinates, on a stack resembling that shown in figure four. This is for use by the TRAP£3 graphics function SD.LINE to draw a line between two points. It is essential that at least 240 bytes are reserved on this

Fig 3

```
LOC      OBJECT      STMT    SOURCE STATEMENT

                       1 *
                       2 *  Three-Dimensional Plotting Routine
                       3 *
0000  3078 0110        4          MOVE.W   $110,A0        $110 = BP.IOLT
0004  43FA 0006        5          LEA.L    PROC,A1        Link to procedure
0008  4E90             6          JSR      (A0)
000A  4E75             7          RTS
000C  0001             8 PROC     DC.W     1              Number of procedures
000E  0010             9          DC.W     LINE3D-*       Relative location of proc
0010  06              10          DC.B     6              Length of proc name
0011  4C44 4E45 3344  11          DC.B     'LINE3D'       Name of proc
0018  0000            12          DC.W     0              End of procedures
001A  0000            13          DC.W     0              Number of functions
001C  0000            14          DC.W     0              End of functions
                      15 *
                      16 * Start of LINE3D code
                      17 *
001E  6100 0062       18 LINE3D  BSR      GETCHAN        Get the output channel
0022  6600 0056       19         BNE      LERR           Error
0026  48E7 001C       20         MOVEM.L  A3-A5,-(A7)
002A  2048             21         MOVEA.L  A0,A0
002C  DBFC 0000 0018   22         ADDA.L   #24,A5
0032  6100 0080        23         BSR      GETPARS        Get the start coordinates
0036  6600 0044        24         BNE      ERROR          Branch on error
003A  47FA 01EE        25         LEA.L    STACKEND-12,A3 A3 = Graphics stack line start
003E  6100 0094        26         BSR      CALC3D         Set 3D to 2D coordinates
0042  4CDF 3800        27         MOVEM.L  (A7)+,A3-A5
0046  6600 0022        28         BNE      LERR           Branch on error
004A  DBFC 0000 0018   29         ADDA.L   #24,A5         A5 = Finish coordinates
0050  6100 006E        30         BSR      GETPARS        Get the finish coordinates
0054  6600 0018        31         BNE      LERR           Branch on error
0058  47FA 01E4        32         LEA.L    STACKEND-24,A3 A3 = Graphics stack line end
005C  48E7 0008        33         MOVEM.L  A4,-(A7)
0060  6100 0066        34         BSR      CALC3D         Set 3D to 2D coordinates
0064  4CDF 1000        35         MOVEM.L  (A7)+,A4
0068  6600 0010        36         BNE      LERR           Branch on error
006C  76FF             37         MOVEQ    #-1,D3         D3 = Indicate timeout
006E  283C 8400        38         MOVE.L   #$84,A4,A1,A0  A0 = Channel ID
0072  43FA 0104        39         LEA.L    STACKEND-24,A1 A1 = Graphics stack pointer
0076  7031             40         MOVEQ    #$31,D0        D1 = SD.LINE
0078  4E43             41         TRAP     #3
007A  4E75             42 LERR    RTS
007C  4CDF 3800        43 ERROR   MOVEM.L  (A7)+,A3-A5
0080  4E75             44         RTS
                       45 *
                       46 * This routine will get the channel parameter, or default to
                       47 * channel #1. It will exit with (A6,A4.L) pointing to the start
                       48 * of the appropriate channel entry in the table.
                       49 *
                       50 * On exit, Zero flag Set indicates error, held in D0.
                       51 *
0082  343C 8801        52 GETCHAN MOVE.W   #$0106,A4,A1,D5
0086  0205 0080        53         ANDI.B   #128,D5        Check for '#' channel
008A  6700 0022        54         BEQ      DEFCH          Branch to default channel
008E  4BE7 0014        55 GETCH   MOVEM.L  A1/D3,-(A7)

LOC      OBJECT      STMT    SOURCE STATEMENT

0092  204F            56         MOVEA.L  A7,A0
0094  5888            57         ADDQ.L   #4,A0          A0=A7+4 = Just first parameter
0096  3078 0112        58         MOVE.W   $112,D0        $112 = IO.FTEXT (Get integer)
009A  4E90             59         JSR      (A0)
009C  4CDF 2800        60         MOVEM.L  (A7)+,A3/A5
00A0  6600 0A0A        61         BNE      GETERR         Branch on error
00A4  3216 9800        62         MOVE.W   $106,D1,A1,D1  D1 = Channel No.
00A8  508E             63         ADDQ.L   #8,A5          A5 = Start of t,y,z data
00AA  6000 0004        64         BRA      SETCHAN
00AE  7201             65 DEFCH   MOVEQ    #1,D1        D1 = Channel No.1 (Default)
00B0  7A28             66 SETCHAN MOVEQ    #$28,D2      D2 = Length of channel entry
00B2  C2C1             67         MULU     D1,D1        D1 = Offset
00B4  286E 0A10        68         MOVE.L   $A10(A6),A4    A4 = Start of channel table
00B8  D9C1             69         ADDA.L   D1,A4          A4 = Start of channel entry
00BA  4A84             70         TST.L    D4           Signal an error
```

DIY TOOLKIT

```
00BC  4E75                    71 GCEXIT   RTS
                              72 *
                              73 * This routine will place the next three parameters onto the
                              74 * arithmetic stack, as floating point numbers.
                              75 * The first time this is called, these will be the starting coordinates
                              76 * and the second time, they will be the finish coordinates.
                              77 *
00BE  3078 0114               78 GETPARS  MOVE.W   $114,A0          $114 = CA.GTFP (Get fl. point)
00C2  4E90                    79          JSR      (A0)
00C4  6600 0008               80          BNE      GPEXIT           Branch on error
00C8  70F1                    81          MOVEQ    #-15,D0          D0 = Parameter Error
00CA  0C03 0003               82          CMPI.B   #3,D3            Should be 3 parameters
00CE  4E75                    83 GPEXIT   RTS
                              84 *
                              85 * This routine expects the 3D X,Y,Z values on the arithmetic stack.
                              86 * It performs the calculations: x=X*100/Z and y=Y*100/Z
                              87 * and places the x and y values onto the graphics stack,
                              88 * pointed to by A3. On exit, the flags indicate an error (in D0).
                              89 *
00D0  720C                    90 CALC3D   MOVEQ    #12,D1           Get 12 bytes on stack
00D2  2D49 0058               91          MOVE.L   A1,$58(A6)
00D6  3478 011A               92          MOVE.W   $11A,A2          $11A = BV.CHRIX
00DA  4E92                    93          JSR      (A2)
00DC  226E 0058               94          MOVE.L   $58(A6),A1
00E0  5589                    95          SUBQ.L   #2,A1            Place 100(fp) on TOS
00E2  3DBC 0064 9800          96          MOVE.W   #100,0(A6,A1.L)  100(int) to TOS
00E8  7008                    97          MOVEQ    #8,D0            D0 = RI.FLOAT
00EA  3478 011C               98          MOVE.W   $11C,A2          $11C = RI.EXEC
00EE  4E92                    99          JSR      (A2)             TOS = 100(fp)
00F0  5D89                   100          SUBQ.L   #6,A1            Copy  Z  to TOS
00F2  3D86 9818 9800         101          MOVE.W   24(A6,A1.L),0(A6,A1.L)    Z-exponent
00F8  2DB6 981A 9802         102          MOVE.L   26(A6,A1.L),2(A6,A1.L)    Z-mantissa
00FE  7010                   103          MOVEQ    #$10,D0          D0 = RI.DIV
0100  4E92                   104          JSR      (A2)             TOS =  100/Z
0102  4A00                   105          TST.B    D0
0104  6600 003E              106          BNE      C3EXIT           Branch on error
0108  3DB6 9800 9812         107          MOVE.W   0(A6,A1.L),18(A6,A1.L)  Copy  100/Z  to BOS
010E  2DB6 9802 9814         108          MOVE.L   2(A6,A1.L),20(A6,A1.L)
0114  700E                   109          MOVEQ    #$E,D0           D0 = RI.MULT
0116  4E92                   110          JSR      (A2)             TOS =  X*100/Z


  LOC       OBJECT          STMT            SOURCE STATEMENT

0118  4A00                   111          TST.B    D0
011A  6600 0028              112          BNE      C3EXIT           Branch on error
011E  3776 9800 0006         113          MOVE.W   0(A6,A1.L),6(A3)         Copy TOS to Graphics COORDS
0124  2776 9802 0008         114          MOVE.L   2(A6,A1.L),8(A3)
012A  5C89                   115          ADDQ.L   #6,A1
012C  700E                   116          MOVEQ    #$E,D0           D0 = RI.MULT
012E  4E92                   117          JSR      (A2)             TOS =  Y*100/Z
0130  4A00                   118          TST.B    D0
0132  6600 0010              119          BNE      C3EXIT           Branch on error
0136  3776 9800 0000         120          MOVE.W   0(A6,A1.L),0(A3)         Copy TOS to Graphic COORDS
013C  2776 9802 0002         121          MOVE.L   2(A6,A1.L),2(A3)
0142  42B0                   122          CLR.L    D0               Signal No Error
0144  4E75                   123 C3EXIT   RTS
                             124 *
                             125 * Graphics Stack area (Must be at least 240 bytes)
                             126 *
0146  =00F0                  127 STACK    DS.B     240
0236                         128 STACKEND
                             129
                             130          END
```

stack area when using the graphics routines. Hence even though the assembly code is only about 350 bytes long, you must reserve 600 bytes of resident memory area when loading the routine.

Figure five shows this routine in the form of a hex loader. Type this in and, when it finishes, type the following:

S BYTES
mdv1_plot,start,600

to save the routine to Microdrive.

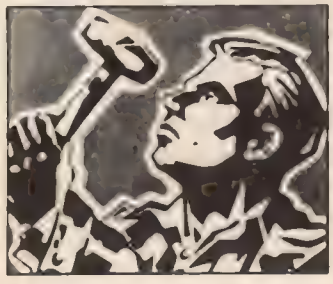
Once this is done, you can test the routine using the demonstration program in figure six. This is based on the demonstration program for a similar command in the Computer Concepts Graphics ROM for the BBC micro. It draws and moves a cube round the screen, based on inputs from the keyboard. Type:

"U" for Up
"L" for Left
"D" for Down
"R" for Right
"I" to move Into the screen
"O" to move Out of the screen.

You will also notice that SCALE has been used to shift the origin to the centre of the defined window — Channel 3. That has the effect of moving the eye to the centre of the window, since it is positioned at the origin, looking down the positive Z-axis. Try running the program without line 120 to see what effect that has.

To run the demonstration program in figure six you will have to set up the LINE3D command. That is done with the following instructions:

a = RESPR(600)



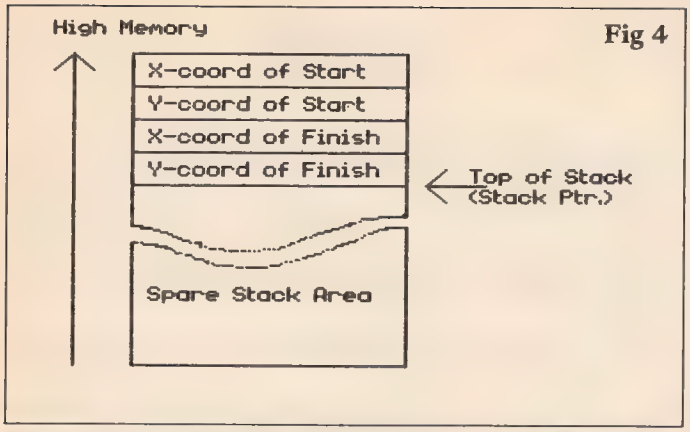


Fig 4

Fig 5

```
100 REMark : Sinclair QL World
110 REMark : ** HEX  LOADER **
120 :
130 CLS
140 RESTORE : READ space
150 start = RESPR(space)
160 PRINT"Loading Hex...":hex_load start
170 CALL start
180 STOP
190 :
200 :
210 DEFine PROCedure hex_load(start)
220 :
230     DEFine FuNction decimal(x)
240     RETurn CODE(h$(x))-48-7*(h$(x)>"9")
250     END DEFine decimal
260 :
270 byte = 0 : checksum = 0
280 RESTORE 2000
290 READ h$ : IF h$="*" THEN GO TO 450
300 IF LEN(h$)<>2*INT(LEN(h$)/2) THEN
310     PRINT"Odd number of hex digits in: ";h$
320     STOP
330 END IF
340 FOR b=1 TO LEN(h$) STEP 2
350     hb=decimal(b):lb=decimal(b+1)
360     IF hb<0 OR hb>15 OR lb<0 OR lb>15 THEN
370        PRINT"Illegal hex digit in: ";h$
380        STOP
390     END IF
400     POKE start+byte,16*hb+lb
410     checksum=checksum+16*hb+lb
420     byte=byte+1
430 END FOR b
440 GO TO 290
450 READ check
460 IF check<>checksum THEN
470     PRINT"Checksum incorrect. Recheck data."
480     STOP
490 ELSE
500     PRINT"Checksum is correct."
510     PRINT"Data entered at: ";start
520 END IF
530 END DEFine hex_load
1000 DATA 600
2000 DATA "3078011043FA0006","4E904E7500010010"
2010 DATA "064C494E45334400000000000000"
2020 DATA "6100006266000056","48E7001C2A4BDBFC"
2030 DATA "000000186100008A","6600004447FA01EE"
2040 DATA "610000904CDF3800","660000032D7FC0000"
2050 DATA "00186100006C6600","002447FA01C448E7"
2060 DATA "00086100006E4CDF","100066000001076FF"
2070 DATA "2076C80043FA01AA","70314E434E754CDF"
2080 DATA "38004E751A36B801","02050080670000022"
2090 DATA "48E700142A4B508D","3078011124E904CDF"
2100 DATA "28006600001A3236","9800508B60000004"
2110 DATA "72017428C2C2286E","0030D9C142804E75"
2120 DATA "3078011144E906600","000870F10C030003"
2130 DATA "4E75720C2D490058","3478011A4E92226E"
2140 DATA "005855893DBC0064","9800700834780110"
2150 DATA "4E925D893DB69818","98002DB6981A9802"
2160 DATA "70104E924A006600","003E3DB698009812"
2170 DATA "2DB698029814700E","4E924A0066000028"
2180 DATA "37769800000062776","980200085C89700E"
2190 DATA "4E924A0066000010","37769800000002776"
2200 DATA "9802000242804E75","*",22696
```

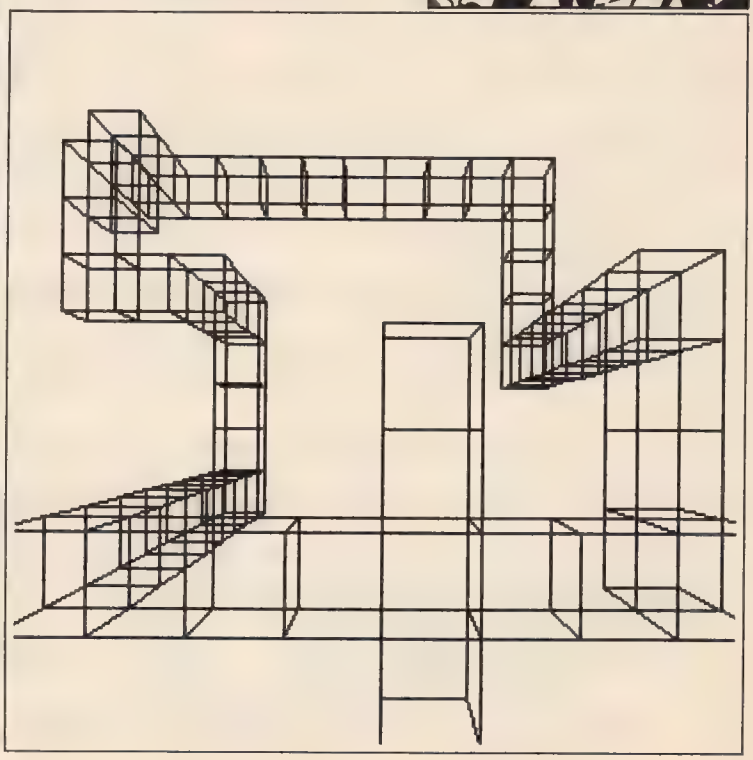
Fig 6

```
100 OPEN#3,scr_400x200a60x0
110 BORDER#3,3,2
120 SCALE#3,250,-175,-125
130 CLS#3
140 d=0:e=0:f=300
150 REPeat loop
160 a$="":a$=INKEY$:IF a$="" THEN GO TO 160
170 IF a$=="u" THEN e=e+50
180 IF a$=="d" THEN e=e-50
190 IF a$=="l" THEN d=d-50
200 IF a$=="r" THEN d=d+50
210 IF a$=="i" THEN f=f+50
220 IF a$=="o" THEN f=f-50
230 RESTORE
240 FOR i = 1 TO 12
250 READ a1,b1,c1,a2,b2,c2
260 LINE3D#3,a1+d,b1+e,c1+f TO a2+d,b2+e,c2+f
270 END FOR i
280 END REPeat loop
290 :
300 DATA 0,0,0,50,0,0
310 DATA 50,0,0,50,0,50
320 DATA 50,0,50,0,0,50
330 DATA 0,0,50,0,0,0
340 DATA 0,0,0,0,50,0
350 DATA 0,50,0,50,50,0
360 DATA 50,50,0,50,50,50
370 DATA 50,50,50,0,50,50
380 DATA 0,50,50,0,50,0
390 DATA 0,50,50,0,0,50
400 DATA 50,50,50,50,0,50
410 DATA 50,50,0,50,0,0
```

L BYTES mdv1_plot,a
CALL a

The uses of this routine are limited only by your imagination. It could be used to produce three-dimensional charts for business, plot three-dimensional graph functions, or even to produce wire-frame graphics for 3D games.

Remember that we want to hear from anybody who has ideas for useful routines which they would like to see in future DIY Toolkit articles. We are looking particularly for short and unusual routines which have not already appeared many times in books and commercial toolkit software.



PDQL Computer Systems and Software

UNIT 1
HEATON HOUSE
CAMDEN STREET
BIRMINGHAM B1 3BZ
021-233 3042

MAKE THE MOST OF YOUR QL

for home or business use — Order from list or write for current catalogue. Prices include VAT and postage within the UK. Cheques with orders to, and full descriptive list available from, PDQL at our NEW ADDRESS. Please state if you have extended memory and/or disc drive.

"If Archive is your interest, then ARCHIVE TUTOR is about the best introduction to the database system available". Sinclair/QL World February 1987.

Make ARCHIVE TUTOR your introduction to a fuller understanding of the published and unpublished commands and functions of Archive. £21

"SCREEN FORMAT PRINTER will prove a powerful addition to your software library." Sinclair/QL World February 1987.

ARCHIVE SCREEN FORMAT PRINTER produces a printed copy of your Archive screen layout; provides a directory of ink, paper and file name; gives details of variables, where they occur, field size, row/column co-ordinates. £7

FILE COMPARATOR compares two files on the same or different volumes and highlights any differences down to the last comma. Both files are displayed sector by sector in character, hex or decimal. Easy re-alignment after comparing any two sectors. £8

FILE COPIER copies from one volume to the other all files, by y/n selection or up to three string match inclusions or exclusions; compares contents and sizes of all files on any two devices (including ram1_) £8

XREF provides a FULL CROSS REFERENCE index of your SuperBASIC programs to screen or printer; logs all variable, procedure, function and extension keyword usage; provides error diagnostics on likely source code faults. INDISPENSABLE FOR LARGE PROGRAMS £15

★ ★ ★ PLUS ★ ★ ★

ARCHIVE SCREEN DESIGNER £15
DATABASE RECOVERY (Archive On The Mend) £20
DATABASE ANALYSER £7
FILE DUMP £7
LAZARUS Disc File Recovery £20
CASH TRADER UPGRADE (existing users) £39
(new users) £80
PDQ PAYROLL £70
VAT ACCOUNTS £25
NAME AND ADDRESS Standard Archive £18
Extra Run Time Module £18
MAILMERGE de luxe £14
INVOICE GENERATOR £30
FOLLOW UP Appointments Diary £48

All PDQL built SuperBASIC programs are now TURBO-charged,

Many other General Utility, Archive Utility and Archive Application systems. New systems or adjustments to existing systems built to order.

EDITOR

Sinclair QL World is looking for a new editor. Knowledge of the QL and home computer market is of prime importance — journalistic experience is not essential, but it will be an advantage to have had some work published.

The job needs someone who is a committed QL user — in addition to a working knowledge of the machine, you should be familiar with the major developments in QL software and hardware over the last twelve months.

Candidates should be qualified to at least A level standard.

Salary is negotiable according to age and experience.

Send your written application including C.V. to:

Brendon Gore,
Ref. QL ED
Focus Magazines
79-80 Petty France
London SW1H 9ED

WALLET FRIENDLY SOFTWARE

★ AMSTRAD PC1512 ★ IN STOCK NOW!

SWOPPER £19.95 — Easy to use task swopping on a 128k QL
- Only uses 8.5k plus screen storage
- Simple "Hot Key" operation — no menus
- Fully automatic task loading & set-up
- Instant swopping/screen preservation
- Easy to follow comprehensive manual
- 128k QL: 1 Psion prog + Basic
- 640k QL: 7 Psion progs + Basic
- Permanent access to Basic
- True multitasking
- Enhanced Basic RESPR( ) command

MICRODRIVE COPYCAT £10.99 — Strictly not for pirates
Copies many protected programs. Sold subject to legal use. Very good value.

BOOT 128k £5.99 — the universal QL "shrink" program
Enables an expanded QL to run programs that won't normally run with extra RAM. Just insert in MDV1_, reset your QL, wait . . . and run your "fussy" software.

1 TO 1 DUMP £5.99
Enables you to obtain true hard copy with 1:1 aspect ratio using Epson FX80.

MICRODRIVE TOOLKITS
Read and write microdrive sectors and read headers from your own Basic or assembly language programs. Full details of microdrive format in comprehensive manual.

BASIC EXTENSIONS £9.99
ASSEMBLY LANGUAGE £19.95
BOTH £24.95

computer ONE

Software for the QL

A selection of quality software packages available directly from COMPWARE

PASCAL	£39.95
FORTH	£39.95
ASSEMBLER	£29.95
MONITOR	£24.95
TYPING TUTOR	£19.95

Inclusive of VAT & P&P.

MEDIC OWNERS: Add 256k for £79, 3.5" drive £119

DEALERS: Wanted for our range of QL software including the Computer One products included in this advert.

COMPWARE
57 REPTON DRIVE,
HASLINGTON, CREWE CW1 1SA
Tel: (0270) 582301
Tlx: 265871 Quote: MAG70076

PRICES INCLUDE VAT AND DELIVERY
EXPORT ORDERS WELCOME: WRITE FOR TERMS

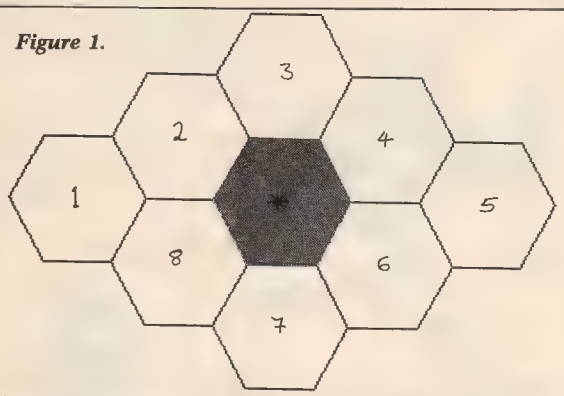
Name: .....
Address: .....
.....
.....
Please send me: .....
.....I enclose £ .....

PUZZLE PAGE

Marcus Jeffery provides more abstract entertainment on a hexagonal theme and reveals the solution to February's mathematical musings.

If you have finished playing with tanks from last month I have a more abstract puzzle for you. Figure one shows the layout of the puzzle board, consisting of eight numbered hexagons (hexes) and a blank hexagon in the middle. From now this arrangement of numbers will be termed the home position and will be represented as:

Figure 1.



1 2 3 4 5 6 7 8 *

The puzzle works by flipping hexes. An adjacent numbered hex can be flipped only with the blank hex and this operation effectively swaps the two hexes. So, given the home position, if we were to flip the blank hex with Hex 2, we would get the position:

```
    3
  *   4
1   2   5
  8   6
    7
```

or:

1 * 3 4 5 6 7 8 2

There are six possible flips available from the home position. They are:

Flip 2 -> 1 * 3 4 5 6 7 8 2
Flip 3 -> 1 2 * 4 5 6 7 8 3
Flip 4 -> 1 2 3 * 5 6 7 8 4
Flip 6 -> 1 2 3 4 5 * 7 8 6
Flip 7 -> 1 2 3 4 5 6 * 8 7
Flip 8 -> 1 2 3 4 5 6 7 * 8

All I want to know is how many flips are necessary to reach the home position from the worst possible position. The worst position is defined as the position which will require more flips to reach the home position than any other. In fact, there is more than one worst position but it does not matter which one you use.

RULES

Entries must be sent by post to: PUZZLE PAGE, Sinclair QL World, 79-80 Petty France, London SW1H 9ED to arrive not later than Monday, April 13, 1987.

The winner will be the first correct entry drawn from the editor's hat.

All entries will be judged by the editor of *Sinclair QL World*. The editor's decision is final and no correspondence will be entered into regarding the result.

ENTRY FORM

Number of Flips from the worst start position is:

.....

Name .....

Address .....

.....

.....

The problem was to find the sum of the digits in the 5,000th term in the expansion of the series:

$$5^{i!} + 7^{j!} + 11^{k!}$$

where i,j,k > 0

I warned you that it was an incredibly big number. I think the comment made by J. Forrest best explains how big. He said: "I calculated that if you were to write it on sheets of A4 paper you would need about 2.5 thousand billion sheets, which would form a pile about 100,000 miles high."

I would like to thank T. Wilkinson for his explanation of how to do this, which is far clearer than the method I used. What he did was to try to find a condition for $5^{x!}$ which exceeds that of $3*11^{(a-1)!}$. He did it using the following method:

(a) Start with the condition:

$$5^{x!} > 3*11^{(x-1)!}$$

(b) Take logarithms on both sides:

$$x! * \log 5 > (x-1)! * \log 11 + \log 3$$

(c) Divide by $(x-1)! * \log 5$:

$$\frac{x!}{(x-1)!} > \frac{\log 11}{\log 5} + \frac{\log 3}{(x-1)! * \log 5}$$

(d) Evaluate the expression:

$$x > 1.490 + 0.683/(x-1)! \text{ for } x > 2.$$

That establishes that the lowest term containing x! as an exponent exceeds all those where x! is not attained. Similarly, (x+1)! is not met until 'i', 'j' and 'k' have all reached x. That means the value of 'i' will not reach, say, 10, until all combinations of 'j' and 'k' between 1 and 9 have been used.

Based on this method, we find that the nearest term to the 5,000th, where i=j=k is 4913 — ie., 17^3. The next term will then be $5^{18!}+7^{1!}+11^{1!}$, the next will be $5^{18!}+7^{2!}+11^{1!}$, then $5^{18!}+7^{1!}+11^{2!}$, and so on. Continuing with this method, we find that the 5,000th term is:

$$5^{18!} + 7^{10!} + 11^{6!}$$

Unfortunately, having found the term, we now have to calculate the number:

$$5^{6402373068572800} + 7^{3628800} + 11^{720}$$

I am sure that even a Cray supercomputer would find the task rather daunting. We know, however, that the number does not have a list of trailing zeros, as would be the case, say, with $10^{x!}$, but contains digits throughout. Therefore, by assuming that the average digit is:

$$(01+2+3+4+5+6+7+8+9)/10 = 4.5$$

Which will not be too inaccurate for a number of this size, we can estimate the answer. Again taking logarithms:

$$18! * \log_{10}5 + 10! * \log_{10}7 + 6! * \log_{10}11 = 4.475 * 10^{15}$$

Because we have taken logarithms to the base 10, the number of digits in the result will be the integer part of this number plus one. Thus, we can finally estimate our answer as being:

$$4.5 * 4.4475 * 10^{15} = 2.014 * 10^{16}$$

I was therefore accepting any entry forms with an answer of $2 * 10^{16}$ or better.

The winner this month is Peter Eldred of Wokingham, Berkshire, who will be receiving a year's free subscription to

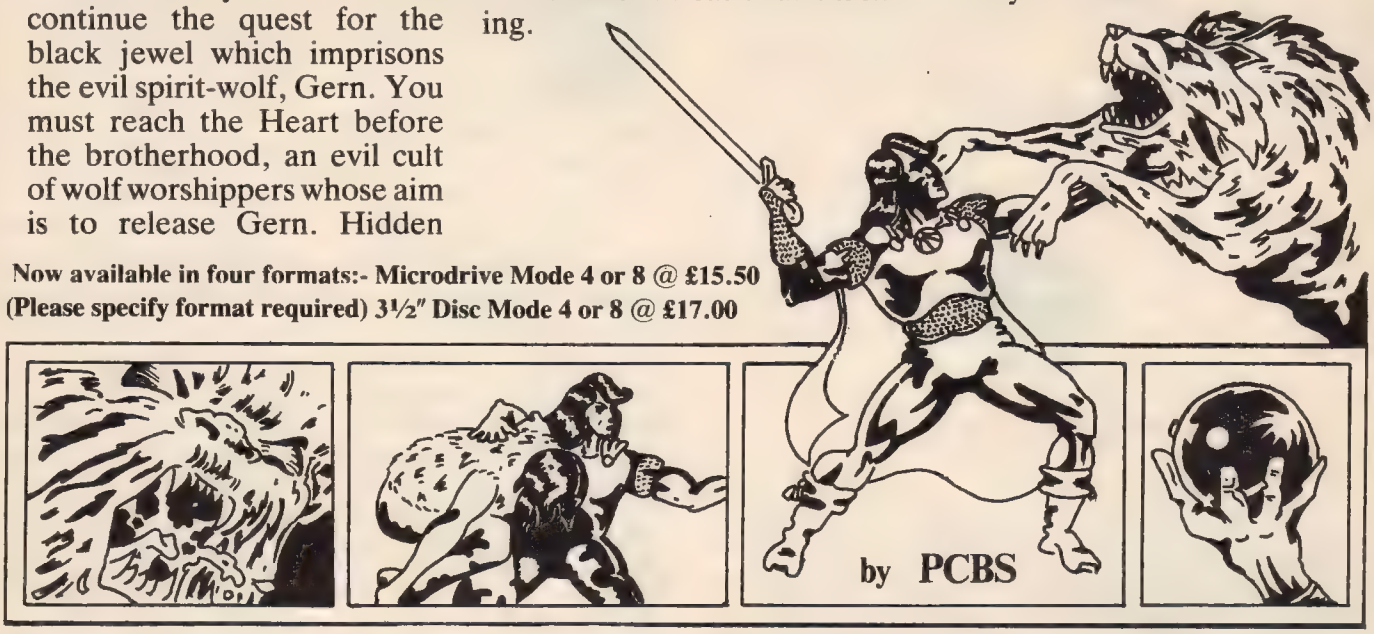
ATTENTION ALL QL ADVENTURERS! CAN YOU BECOME THE HERO OF THE 'PRINCELANDS' IN THE ENTHRALLING NEW EPIC

THE HEART OF GERN ?

© 1987

The "Heart of Gern" is the first of a challenging series of adventure games devised to test even the most battle scarred adventurer. Set in the magical fantasy world of the 'Princelands' you Tirac must continue the quest for the black jewel which imprisons the evil spirit-wolf, Gern. You must reach the Heart before the brotherhood, an evil cult of wolf worshippers whose aim is to release Gern. Hidden away in a secret vault protected by guards, traps and magical deceptions it will take more than luck to succeed, it will take skill, determination and above all rational thinking.

Will this be the dawn of a new dark age or can the evil brotherhood be thwarted? The fate of the 'Princelands' is in your hands.



Now available in four formats:- Microdrive Mode 4 or 8 @ £15.50
(Please specify format required) 3½" Disc Mode 4 or 8 @ £17.00

Send your cheques, P/O to: PCBS, Studio 204, Seedhill Offices, Paisley PA1 1JN. Please allow 28 days for delivery.

Qram

NOW faster file copying

AT LAST!!

A completely new QL environment for every expanded QL

★★★ Non-destructive windows — for all standard QL programs including the PSION suite and any pure program can pop-up at a single ALT keypress

★★★ Single key pop-up menus — for job control, file maintenance (view, copy, backup, move and delete), multitasking print spooler and other functions

★★★ Full multitasking — includes utilities to maintain the QL's full multitasking capability even with programs such as the PSION suite

★★★ Super-fast RAM disk — is dual mode (dynamic and static memory allocation) and can load a complete Microdrive cartridge in just 9 seconds

★★★ Dynamic printer buffer — cuts out the waiting for programs to finish their printer output by using the whole of the QL's memory as a buffer

★★★ Multi-mode screen dumps — to a variety of printers, at a variety of scales, inverse or normal, dumps windows, jobs or the whole of the screen

Qram is suitable for all QL's with at least 256 kilobytes of RAM.

				Mdv	3½	5¼	ROM
Qram	**RAM based utilities**	there's nothing like it	**£29.90**	●	●	●	
QTK II	**Super Toolkit II**	the original QL toolkit	**£29.90**	●	●	●	●
Qmon II	**Monitor/debugger**	the one we use ourselves	**£19.95**	●	●	●	
QEP III	**EPROM programmer**	worth £1000s, but only	**£129.95**				

Prices include VAT Please add £1.00 pp UK

QJUMP LTD
24 KING STREET RAMPTON
CAMBRIDGE CB4 4QD
Tel: Cottenham (0954) 50800

UTILITY FILE

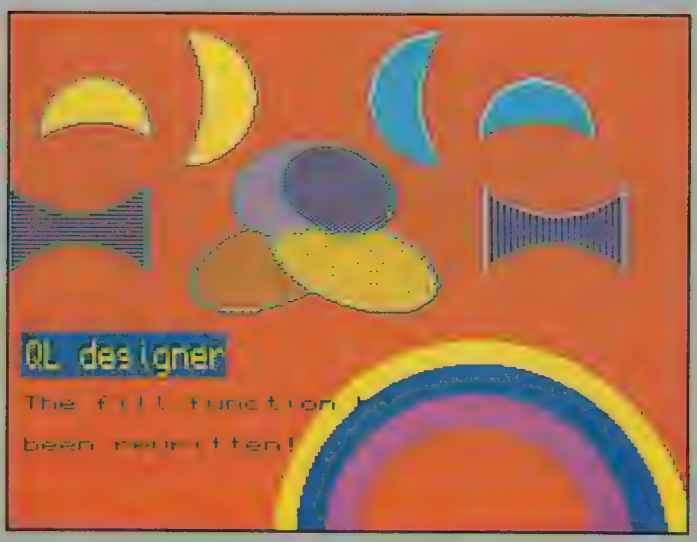
Ron Massey provides our regular round-up of all that is new on the serious software scene.

QL Designer
Pyramide
£19.95

The new Pyramide graphics program, *QL Designer*, utilises QL turtle graphics and produces files more related to character files than to the more usual binary screen dumps. For that reason, files are typically compact, usually occupying less than 3K of media space.

Drawings made with Designer can be saved in layers, a method more common among animators than computer artists; backgrounds, foreground objects included thereon and text can be treated as separate considerations.

Backgrounds can be saved as files and individual objects, such as often-used electronic components — or other repetitive symbols, technical or otherwise — can be saved as cells and loaded subsequently into a palette for use in a current drawing.



Drawing and the subsequent alteration of a drawing occur at two levels. From the user's point of view, making changes is very little different from any other drawing program, with the exception that each segment of the portion of the drawing being changed is offered, in the same sequence as it was originally made, for alteration.

You have an option of setting the shape or colour of a segment, either outline, fill or stipple — in any combination — using the Designer's rather slick colour-selection menu. When the changing sequence is completed, the altered element is re-drawn either at its current position or at a new specified position.

Looking at the editing sequence from the program point of view, the process is more like editing a character file, where the positioning data, colour, and other picture information is stored.

One of the difficulties presented by the QL for Designer, and to most other graphics programs, is the ability to fill re-entrant shapes successfully. Designer has overcome the problem by including its exceptional FILL routine.

One of the interesting features of Designer, useful for shop window, exhibition stand or educational applications, is that once you have acquired a collection of pictures you have the option of re-playing them in a continual display. From a menu, you can choose to re-play your pictures in a particular order, or not, and include a specified time delay between each picture.

QL Designer has been written so that users have the option of using the program entirely with keyboard input or, with small alterations to the boot program, drawing with the Eidersoft mouse system. Either way, with the exception of text, almost all command input is made using single key-presses. Of the consistently high standard on which Pyramide has established its reputation, QL Designer is a very flexible program.

XREF
PDQL
£15

From the PDQL rapidly-growing collection of programs authored by Chas Dillon is one of the most valuable development utilities I have seen, *PDQ-XREF*.

Using PDQ-XREF could not be simpler Load Turbo Toolkit, load your SuperBasic program EXEC PDQ-XREF and follow the screen prompts. Once past the default set-up page, the program is entirely automatic.

A number of options from the set-up page allow you to print a

program report to drive, screen or printer. Choosing the latter, more options are available for formatting a page to suit your particular record-keeping system and setting-up the output file generated to serial or parallel ports.

You have the option when PDQ-XREF starts up to obtain a complete report or, where that is not required, produce only the exception listing.

Up and running, PDQ-XREF analyses your SuperBasic program in memory and, after a period of thinking, details the statistics concerning your program — the total number of Names, User names, the number of occurrences and buffer size.

The next report

produces an alphabetical listing for each program procedure, function, array, scalar variable, integer or string variable or function and user-defined terms for assignment, DIM/Define, Local/Define, FOR and Repeat Identifiers and each line number on which they occur. The penultimate report includes all system and extension commands or functions encountered in the program.

At the tail end of the report is an exception listing and the line number of the first occurrence of any found. From a developer's point of view, this may well be the most valuable service performed by PDQ-XREF. In addition to any dead wood found in a program, the exception list includes all occurrences of apparently unused program operatives which could point to possible problems.

Particularly useful for large programs, although size does not matter, a PDQ-XREF report for a 3,000-line program, for example, can exceed 16 pages of detailed information.

Whether you are a complete beginner or a seasoned programmer, PDQ-XREF is an indispensible aid for extracting salient details from a Basic program not otherwise easily obtainable — at least not without having to spend hours collating information from a listing.

UTILITY FILE EXTRA

Ron Massey reports on the latest software updates.

The latest release of *Taskmaster* has been revised almost to the point of being a completely new system built round the original concept. No fewer than 19 new features have been added, one of the most interesing being the facility to go into a "learning" mode, "memorising" virtually any kind of input, which can be saved as a file.

Complete standard forms, Quill page formats, price lists and similar requirements are only a few of the possibilities available for using Command Files.

Taskmaster is now supplied on disc and Microdrive. Sector Software, relying on protection by copyright laws and user integrity, no longer requires a tie to the master cartridge being present in mdv2_ on start-up.

File options include copying individual files, back-up of an entire medium, re-naming files, add another program to those currently running, media formatting and directory.

When adding another program to those already running, you assign memory allocation and whether or not to have the new program use code-sharing mode. With full duplicate code-sharing ability, up to 12 spreadsheets can be held in memory with 230K free memory still available. Any new programs started with this option appear on the Input Desk automatically.

Adding programs to the multi-tasking environment has been made more flexible and key assignments for program calls have been changed slightly to accommodate the facility. Up to eight programs can be placed on the Input Desk and are called by using the <ALT> and 1 to 8 number keys; <ALT> <9> returns you to Basic; <ALT> <F1> recalls the input desk; <ALT> and a number key will take you directly to the program assigned to the key.

Memory allocations with a minimum of 10K per program can be defined for each file. Where an allocation is too small for a program, the entry is ignored. By using the once-run patch supplied, changing the access key from <ALT> to <ALT> <SHIFT>, the Psientific *Key Define* can now be used with Taskmaster.

The notepad module includes word wrap, file save and load options, edit and ZAP. Access to the Taskmaster Command learning module is on the Notepad Menu.

The Taskmaster calculator now supports "raise to the power of" and retains the last number entered. Processing a group of numbers will produce a running total each time the <ENTER> key is pressed. Results of a calculation can, using <SHIFT> <ESC>, be

QL Sideways Print Talent Computer Systems £19.95

A limitation of all text editors is that finished documents are printed as viewed on-screen. To produce A5 manuals or similar publications, A4 copy must be reduced with a photocopying machine; for small print runs reductions tend to be expensive.

Talent *QL-Sideways* solves most if not all of the problems associated with publishing, where small numbers of professional-quality documents are needed.

A text-only package, Sideways uses documents containing printer control codes such the Quill *_lis* files made by using "print to Microdrive" — or disc — instead of printer command.

System formats support Simple, Complex/ Spreadsheet or Booklet options. Simple document formatting consists of single sheets of printed text; Complex documents format all text pages as a single large unit or can amalgamate any number of text pages in poster format. Booklet mode offers either of two formats, Edge-bound or Centre-bound.

Edge-binding is formatted with pages one and two printed on obverse and reverse sides of a page respectively. Left and right margins alternate for successive pages. Centre-bound documents are formatted so that, when assembled, using a six-page booklet as an example, the page sequence reads 1, 2, 3, 4, 5, 6, blank, blank.

Once you have established the final form systems options ask if the block of text should be re-positioned on the page, to choose either full character width — 19/216 in. — or half-width — 10/ 216 in. — change the form width or number of lines per page and multiple pages for the Simple and Complex printing modes.

The font selection menu asks for the device containing font *_defn* files. Selecting a font from the directory menu installs the font. You have the option of designing your own character sets but fonts must be designed using the Sideways font editor. Fonts produced by other programs such as Eye-Q or Nucleon font editors are not compatable with Sideways.

Sideways presents the user with very few limitations. Because some of the character control codes interfere with its operation, only Bold, Enhanced and Underline options are supported. Other control codes are ignored.

Compatible with standard and expanded QLs, the main limitation is the printer. Designed to be used with Epson FX-80 or compatible printers, Sideways utilises the user-defined character mode available on the FX-80 and will not function without it.

Users with Canon PW1080 or Taxan/Kaga printers must have the 3K buffer — DIP switch 2-3 — in the off position.

I found Sideways an excellent program and particularly easy to use. Entirely menu-driven, most of the commands are made from single key entries. I felt that a re-configuration program, with drive options defaulting to those chosen by the user, should have been included. Also par is not supported and its emulation must be added to the Sideways BOOT.

sent to the program currently running at the cursor position.

When exiting Taskmaster, a software re-set routine first looks to see if any files are open. If so, a screen warning indicates which files require closing; if not, a key press will software reset your QL.

In his report, Marcus Jeffrey described Taskmaster as the Rolls-Royce of the Multi-taskers. I suppose in that sense, Taskmaster is now top of the Rolls-Royce range. What else is left? The first of what will probably be many new or revised programs to be released using *Turbo* and *Turbo Tookit, The Editor* is faster and better than ever. Taking advantage of more compact code produced by Turbo — previous versions were compiled with Supercharge — something of the order of 15 percent new features have been added to the already impressive Editor command structure.

Searches can now be made on the basis of minimum or maximum line lengths with the new NT and NS commands. When used with the RP command, a report will be made of the number of lines having the parameters set by NT or NS.

The range of text file formatting commands has been enhanced — TA, for asymmetric tab points; TR, removing tap points; TI, insertion of tab points; TD, deleting tab points; TC, tabs compression or its reverse option, TE; CP has been added to move the cursor to the start of a paragraph; SI, for setting the indent margin.

Find and exchange — F and E — commands have been expanded so that string searches made with two special characters, "<" and ">", will be found only where the string is located at the beginning ("<") or end (">") of a line.

A command for deleting a memory file, Z — the ZAP command familiar to Psion program users — will offer a second chance to abort the command if a change has been made to a memory file but has not yet been saved to a drive. Otherwise the file is deleted from memory and the screen is cleared.

Overall, Editor has a smoother feel about it. Cursor over-shoot in row and column has been greatly reduced, as has file loading time.

A point raised by Freddy Vachha of Digital Precision is that, where users are specially concerned with program speed, special versions of almost any program compiled with Turbo can be optimised for speed as its principal parameter. That it will also mean an increase in program size could be of little importance for those seeking Maserati performance.

Information

PDQ-XREF	PDQL, 49 Frederick Street, Birmingham B1 3HN Tel: 021 233 3042
QL Sideways Print Technikit	Talent Computer Systems, 101 St James Road, Glasgow G4 0NS Tel: 041 552 2128
QL Designer	Rio Promotions, 28 Waverly Grove, London N3 3PX Tel: 01-349 2764

CST QL Expansion

from the creators of . . . Thor

QDISC
new eprom 1.19

The best-selling floppy disc interface (now issue 4) is fitted with a 16K EPROM containing many 'Toolkit' extensions, and CST's new Ram Drive 2. It may be used with most 3·5″ or 5·25″ floppy disc drives, CST's own twin slimline double sided 80 track 3·5″ units being exceptional value for money, with 720K of formatted storage per drive. The Toolkit provides a wide range of SuperBASIC commands and functions designed to improve access to the powerful facilities of the QL without the need for machine-code programming. Job control is made easier, files can be used for random access, alternative character sets can be produced, 'wild cards' can be used in file operations, etc.

Ram Drive
the fastest ever!

The Ram Drive device driver allows free memory to be used as though it were a very high speed disc, in fact the fastest such device when used with the RAM-plus. Ideally used for the storage of temporary results, or multiple screen images for animated displays, it also eases the copying of files in single disc systems. The Ram Drive can only use memory which is free, so the full advantage is only felt if the QL is equipped with additional memory. Built into QDisc 4 and Thor, the Ram Drive is also available on 3·5″ and 5·25″ floppy disc.

RAM plus

The CST RAM-plus unit expands the available memory of the QL to the limit of 640K. Using high grade 256K memory devices, this unit is the only one which offers the high performance of no wait-state operation. Housed in a rugged metal case, the RAM-plus unit has an expansion slot which duplicates the QL's, allowing any other CST peripheral to be used. Among the advantages derived from using the RAM-plus are the performance improvements of software and storage devices, and the ability to multitask several programs at once.

SCSI

CST's Interface for Rodime compatable Winchesters handles up to 8 SCSI devices and is complete with floppy disc interface. Using enhanced QDISC software, it supports heirarchical directories, easing file management; with well over 1000 files being possible, this is absolutely essential. A Data Management Utility is provided which speeds up backups by only copying recently modified files.

Q-488

The Q-488 provides comprehensive yet simple access to the IEEE 488 Instrument Bus for the Thor and QL. Developed with IEEE specialists Procyon Research Ltd, the Q-488 interfaces to equipment directly from SuperBASIC and other languages and provides commands for low level bus control and even built-in bus analysis.

Thor

The CST Thor is the ultimate development of the QL. Available in single and dual floppy and 20M SCSI Winchester models each with 640K RAM, parallel printer and mouse ports, battery-backed clock and separate 84 key PC-AT style keyboard, it is built into an attractive metal case with internal power supply and expansion slot for peripherals. Supplied with many unique extensions to QDOS including multitasking at a single key-stroke, enhanced screen windowing and making full use of all the keys on the full-travel keyboard, the Thor is supplied with a specially commissioned version of the Psion Xchange software suite, and a comprehensive manual. Contact CST or your local distributor for details.

CST

Cambridge Systems Technology
24 Green Street, Stevenage, Herts SG1 3DS
Telephone: Stevenage (0438) 352150

Please supply:–	UK inc VAT		Overseas	
Qdisc Interface 4 (3.5″ util. disc)	£79.95	☐	£72.70	☐
Qdisc Interface 4 (5.25″ util. disc)	£79.95	☐	£72.80	☐
QEP-III Eprom programmer (QL/THOR)	£115.00	☐	£103.20	☐
RAM-plus 512K QL memory	£139.95	☐	£125.20	☐
CST Dual 3.5″ cased floppy discs	£219.95	☐	£200.40	☐
CST Q-488 GPIB instrument interface	£224.25	☐	£198.40	☐
CST QDISC SCSI interface	£230.00	☐	£203.40	☐
Qdisc 4 + dual 3.5″ drives	£275.00	☐	£249.40	☐
Qdisc 4, RAM-plus + dual 3.5″ discs	£405.00	☐	£363.60	☐
3.5″ Utility disc inc. Ram Drive 2	£10.00	☐	£10.00	☐
5.25″ Utility disc inc. Ram Drive 2	£10.00	☐	£10.00	☐
Eprom V1.16 for issue 2/3 Qdisc	£15.00	☐	£15.00	☐
Eprom V1.19 for issue 4 QDisc	£15.00	☐	£15.00	☐
Thor 1F (Single floppy)	£688.85	☐	£620.00	☐
Thor FF (Dual floppy)	£803.85	☐	£720.00	☐
Thor WF (Winchester + floppy)	£1608.85	☐	£1420.00	☐
	Export administration		£5.00	☐
	Airmail outside Europe		£5.00	☐

Prices are inclusive of carriage
CST reserve the right to alter prices and specifications without prior notice

Name _____

Address _____

_____

_____

Post Code _____ Telephone _____

I enclose a cheque/PO for £ _____

Please deduct my Access/Mastercard/Eurocard/Diners Club a/c

Card No. _____

Expiry Date _____

Signature _____

CST Thor TIMES CST
No. 870401

68020 Version Announced

Already at "beta test" sites for final validation the Thor-20 system, based on the Motorola MC68020 32 bit processor, is expected to be released by CST this month (April). The system will be available with an optional MC68881 Floating Point Coprocessor (FPC) and a choice of two clock speeds: 12.5 MHz and 16.7 MHz as compared with the 8 bit Thor's 7.5 MHz.

As well as by increasing the clock rate of the processor, performance is increased in two main areas. One is the MC68020's enhanced architecture which includes an on-chip instruction cache, a fast local memory which holds recently accessed instructions; the next time the instruction is executed (often soon afterwards) it does not need to be fetched from main memory, saving considerably on execution time; this increases performance by typically 3 times at 12.5 MHz. The other main improvement is the FPC which increases the performance of floating point operations up to 100 times in programs rewritten to use the FPC. The floating point utilities have been rewritten to make use of of the FPC, giving a dramatic performance improvement in SuperBASIC programs, screen graphics and other software using the utility vectors. Support software for other languages is being arranged.

The Thor-20 is supplied with complete supporting documentation, including Motorola's definitive User Manuals for the MC68020 and MC68881. Also provided is a suite of development software comprising an extended Macro Assembler by Talent Computer Systems which supports the full MC68020 and MC68881 instruction sets, and a Linker by GST. Projected prices for the 12.5 MHz version are £600 complete (ex VAT) and £425 without the MC68881, the 16.7 MHz version costing about twice this. These prices are in addition to the corresponding basic Thor, when either purchased complete, or as an upgrade to an existing Thor that is either still within its initial warranty period or covered by a current service contract.

CST Attacks International Market

As Thor sales increase in the UK, so too does international interest in this exciting system. Now not only is the range available direct from CST but also from a number of distributors who will cover a large proportion of the overseas markets. Of course a major advantage to the end user is the comprehensive post sales support, particularly valuable to overseas customers. Additionally on the software side, a wide range of foreign language versions of Xchange are being produced making the Thor an extremely attractive package.

The Thor range is now available from:

dansoft

DANSOFT
Dronningensgade 15
1420 Kobenhavn K
DENMARK
Tel: (01) 57 84 00
(01) 57 82 02

KOMIN

KOMIN
De Greefstraat 15a
5622 GJ Eindhoven
NETHERLANDS
Tel: (040) 45 66 60

futura datasenter a.s.

FUTURA
DATASENTER A.S.
5582 Olensvag
NORWAY
Tel: (04) 76 89 28

SPEM

S.P.E.M.
Via Ponchielli 26/C
10154 Torino
ITALY
Tel: (011) 85 65 19

PSITRONIC AB

PSITRONIC AB
Box 3094
400 10 Goteborg
SWEDEN
Tel: 31 12 83 80
31 13 40 12

curry computer

CURRY COMPUTER
P.O. Box 5607
Glendale
Arizona 85312 5607
U.S.A.
Tel: 602 978 2902

Service Contracts

All Thor computers include a full six month warranty and support service. This may be extended to twelve months at the time of purchase for £50 (ex VAT). Thereafter, additional 12 month service contracts are available at £100 for Winchester models and £75 for all other models.

The service contract gives a repair (or replacement) service including delivery and collection within the UK. Also included is a software support service and a free annual update of Psion Xchange and other software packages.

Microdrives for the Thor!

Due to popular demand, CST are now offering an external microdrive option for the Thor allowing easy transfer of a wide range of QL format software.

This option gives the ability to run protected microdrive software which require the presence of a microdrive "key" to run, even though the program may be loaded from disc.

The option costs £34.50 (inc VAT) when ordered with the Thor. For full details contact CST on (0438) 352150.

Next Month: Thor Presentation in Denmark at British Embassy

SOFTWARE FILE

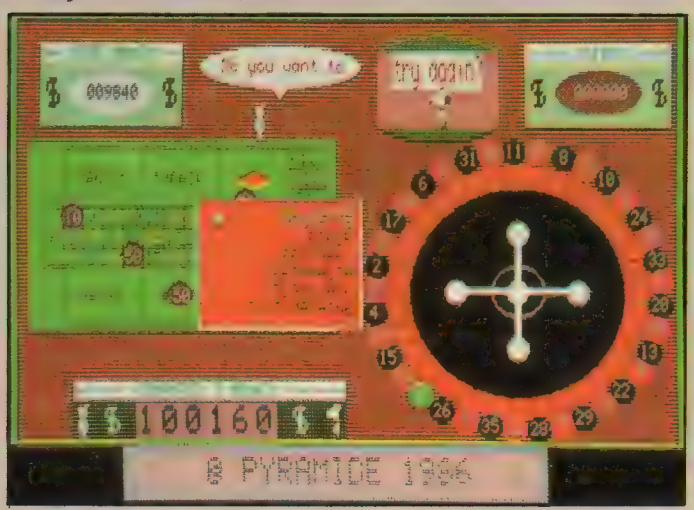
Ken McMahon tries his hand at gambling games and reviews a futuristic arcade adventure.

Super Croupier

Pyramide
£15.95

Pyramide is a company that in a relatively short period has developed a reputation for producing QL software of high quality. Super Croupier is the latest addition to a long list of titles, both games and utilities, that the company has released in the past year.

A gamblers compendium, the package contains just about every type of casino game imaginable; Roulette, Blackjack, Baccarat, Carta



+ Alta, Poker and slot machine. The games are selected from a main menu and a common screen layout is maintained throughout. That means it is possible to switch quickly from one game to another if you get bored.

My high expectations took a bit of a bashing after a few games of Roulette. You start with $10,000 and the computer, which acts as banker, has a reserve of $100,000. There is a $50 house limit. First, using the menu, you must place your bets, all the usual Roulette options are available. There are two characters called Snoopy and Willy present in all the games who ask you to place your bets, tell you how much you have won or lost, and so on.

Lots of other information, possibly too much, is provided on screen. A table shows details of your win/loss record, and occasionally that is given in the form of a chart. Naturally, the Roulette table occupies most of the screen. It is beautifully drawn, but I was extremely disappointed with the wheel — it does not spin. Instead, a white circle spins around the static wheel highlighting each of the numbers in turn before coming to rest.

Roulette is undoubtedly the best of the bunch. The others, with the exception of Slot Machine are all card games. The format is essentially the same. The cards in your hand are depicted on the screen and the computers are displayed face-down. Snoopy and Willy ask how much you want to bet and the game continues in that fashion.

All of the six games suffer from the same drawbacks. The problem is that the screens are badly designed and cluttered. Also, the menus have not been terribly well thought out. After each spin of the Roulette wheel, you are once again presented with the main menu asking which of the six games you want to play. The instructions are inadequate, consisting of bare description of the game. No rules are supplied for any of them so if you do not know how to play - hard luck.

Diehard gamblers will no doubt love it, but I have to say that as far as I am concerned Super Croupier does not match Pyramide's usual very high standards.

Strip Poker

Talent
£14.95

This review is X rated, so if you are under 18 I suggest you turn the page and take a look at utility file. Alternatively, you could cover it up with a piece of paper and read one of the other reviews.

On the assumption that I am now talking to consenting adults only, Srip Poker is a computer version of the card game in which, if you are not lucky, you can literally lose your shirt. You play against Denise, an attractive bundle of pixels in red jeans and a striped T-shirt.

For those unfamiliar with the rules, each player is dealt a five card hand and given the option to start betting or 'ante up'. At this stage you can call it quits if your cards are no good. Having taken the plunge you can then change up to three of your cards in order to improve your chances. The best hand you can hope for is a straight flush — five cards of the same suite in running order. What you are more likely to end up with is a pair — two cards with the same number. If you do not even have a pair, it is probably wise to cut your losses and throw in your cards.

Both you and Denise start with £200. When that runs out, off comes the T-shirt. You are supposed to be a good sport and remove your clothes if you are the unlucky one. Having stripped off, you get another £200 to play with.

If you are unfortunate enough to lose an item of clothing, if you win the subsequent round, you are allowed to put it on again. The best thing to do in that situation is reset the machine and start from scratch. After all, where is the fun in putting your own clothes back on?

The screen is well designed and the graphics are, well, very good

Omega

Caret Computers
£14.95

'The year is 2156. You are a mercenary codenamed Omega and your mission is to seek out and destroy a powerful government computer system hidden deep beneath the ground. It is well defended and you will need exceptional skill and agility to succeed in your task.'

So goes the blurb on the packaging for this enormous 3D arcade adventure from newly formed Caret Computers. The game is in fact so large that it will run only on an expanded QL.

The design of the screen gives the impression that you are sitting at the controls of some kind of vehicle. A 3D view of the outside world is provided by the main window around which is arranged other instrumentation — a direction indicator, energy level meter, radar screen and early warning indicator. A further window in the bottom left provides other information on your status by means of scrolling text.

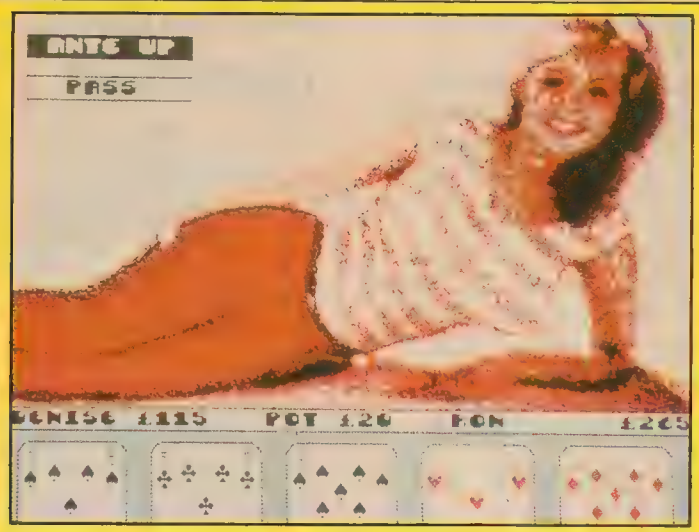
You start out at a crossroads in the middle of nowhere, this is one game where mapping is absolutely essential. If you do not make a map you will find yourself totally lost in a matter of seconds. Movement can be accomplished either by use of the cursor keys or a joystick on the 'turn and move forward' principle.

If your mapping is any good, after a short while, at the end of a T-junction you will discover a large house which you have no choice but to enter. You will be given a password — which is not too difficult to guess — so that you can re-enter the game at this point should something fatal befall you.

One thing I have not yet mentioned is that en route to the house you will encounter nasties in the form of bird-like creatures. Using the gunsight crosshairs which will appear in the viewing window you must gun them down without delay. Every second costs you precious energy and if that runs out you are dead.

The game progresses in much the same fashion, entering a maze, destroying the nasty creatures and finding the doorway to the next. The objective being to find the underground computer and destroy it — I did not get quite that far.

Omega is an enjoyable and challenging game and by far the best of this month's offerings. The one criticism I would make is that each time you move, the screen update is not exactly what you would call instantaneous — it takes a second or two. That, however, is a small price to pay for what is otherwise an excellent game in all respects.



indeed. Most of the screen is occupied by Denise and the cards are displayed along the bottom. Selection is made by directing a pointer using the cursor keys.

During the course of a hand Denise chats to you via speech balloons to let you know what is going on. She says things like 'I ante up what about you', 'Fortune favours fools, I pass', if you are lucky; 'How shall I hold with these cards, you win', and if you are very lucky; 'I'm dead broke, I undress a bit for £200'.

The thought of thousands of pairs of sweaty palms hovering over keyboards in darkened rooms in an attempt to remove the clothes from a digitised female seems to me somewhat sad, if not entirely ludicruous. Having said that I cannot deny that it is amusing.

What Talent has attempted to do, it has done extremely well. Whether you love it, or find the whole idea thoroughly distasteful, you cannot deny it has been well done.

Which Joystick?

You can count the number of QL joysticks available on the fingers of one hand, but with an inexpensive adaptor the chjoice is considerably widened. We check out the options.

Most arcade games, if not impossible to play using the cursor keys, are greatly improved by the use of a joystick. The bad news is, that with the possible exception of the DJW joystick reviewed in the February issue, there is not a single good QL dedicated joystick on the market.

The good news is that there are lots of other joysticks that you can plug into the Ctrl 1 port with the aid of an inexpensive adaptor. We took some of the most popular joysticks available and put them all through a gruelling test on the most physically demanding QL arcade games including QL Karate, Droidzone and Tankbusters. This is how they fared.

Euromax Pro Ace
£10

Micro Ace
£15

On the surface, the only difference between these two joysticks is the colour of the stickers and handles. In use, however, they behave very differently.

The difference lies in the switching mechanism. The Micro Ace uses what Euromax call a 'uniquely constructed bearing and gate assembly'. Unique or not, it works perfectly and allows for super-accurate and very positive control.

The Pro Ace, on the other hand, is horrible. It is stiff, sticky and has a totally dead feel about it. The square symmetrical design of both joysticks means they can be used equally well by right or left-handers.

Suzo Arcade
£19

A little on the expensive side, but sturdily built, the Arcade is similar in design to the Euromax Elite. It is very good at diagonals, because there is a lot of space between the horizontal and vertical switches. There is not very much you can say about this joystick. It feels nice, works well and is built to last.

Konix Speed King
£15

The Speed King is the first and only joystick ergonomically designed to fit in your hand. A bit of a disappointment for left-handers like me, because the positioning of the fire button as well as the shape make it impossible to use.

If you are right-handed you are in luck, because the Konix overcomes the major problem with all joysticks — that of keeping a hold on them when you are under heavy attack and need to execute some severely evasive manoeuvres.

Spectravideo Quickshot Turbo
£15

This is an upgraded version of the best selling Quickshot II joystick. It has two grab patches on the base for secure holding and a fire button on the top. The Turbo, in common with the Cheetah, has an autofire switch. There are those who say it is not a patch on the original, probably because the grip is very stiff. Recommended for body builders.

Euromax Elite
£13

Euromax are prolific producers of joysticks, they manufacture no less than five of the joysticks we looked at. The Elite, like most of the others is of the variety which has a fire button on the base rather than on the handle. The base itself is shaped rather like the outline of a figure eight which some people might find comfortable, but I could not get to grips with it.

Despite the claims made for accuracy the Elite suffers from a common problem, the four diagonal movements are not always easy to find — you end up with left, right, up or down. The switching has a positive feel, but I could not help feeling that with a better joystick I would have got better results.

Cheetah 125 +
£9

This is more my kind of joystick. It has no less than four fire buttons, two on the base and two on the grip. You can stick it on the table with the four plastic suckers located on the base and it actually stays there.

While the Cheetah is very comfortable to use and high on features, it has two drawbacks. There is no positive clicking of the switches, which means that diagonal directions are very difficult — not a joystick for Karate players.

Second, it does not have a very solid feel about it, in other words it is cheap. Whilst it did not show serious signs of deterioration I know from experience that after a couple of hours hard grind these kind of joysticks can, and eventually do fall apart if you are tough on them.

Euromax Satellite
£24

The full title is 6006 Satellite Control Station.
The good things about it are:
It is very big.
It has six suckers and sticks like glue.
The bad things:
It is cheaply made.
It is expensively priced.
It has a sloppy action.
It is not worth buying.

Euromax Wiz Card
£6

The Wiz Card is not so much a joystick as a cursor controller. It is a slim card with two fire buttons and a four-way cursor control pad. It is excellent for games where single-step accuracy is required, but not for much else. The fire buttons are positioned below the cursor pad which makes operations a job for a contortionist.

The Definitive SuperBASIC Compiler

Liberator EXTENDED VERSION NOW AVAILABLE

* FASTER compilation; over TWICE AS FAST as Release 2.0. * Compilation direct from source file when used with QLOAD. * FASTER at runtime due to new code optimisations including automatic integer FOR loops * MORE FLEXIBLE * Make the compiler or any compiled programs into resident procedures. * ROMable code generation * Compatible with QRAM windowing and hotkeys.

STILL THE ONLY COMPILER which implements all of SuperBASIC. The only compiler which handles large programs on 128k systems and the easiest to use by far. No need for resident toolkits to support compilation, no need to pepper your programs with pseudo keywords or read self-indulgent documentation. With Q_LIBERATOR, compilation is painless. Here's what one convert says:

"I ordered TURBO in November and although it was advertised since October, I didn't receive a copy until February. Then I found that it couldn't compile my programs on an unexpanded JS QL, returned TURBO and bought Q_LIBERATOR. In contrast Q_LIBERATOR successfully compiles my programs without alteration and delivers what it promises."
- M Parfitt, Hersham

Why wait? Q Liberator Rel 3.0 is available immediately! **PRICE £59.95**

Supplied on microdrive or 3.5inch disk with convenient A5 sized manual.

Existing users. Send master and £9.95 for upgrade to 3.0 and free QLOAD and QREF.

NEW! ESSENTIAL SUPERBASIC TOOLS NEW!

When creating Q_LIBERATOR we devised some utilities to make development of large SuperBASIC programs more agreeable. Now the first of these are available to all SuperBASIC programmers. You'll wonder how you ever managed without them.

QLOAD is an intelligent, fast loader for SuperBASIC programs which cuts loading times dramatically. eg 10 minutes to 10 seconds. Not just a simple memory image; QLOADed programs are portable between different QL ROMS and memory configurations. QLOAD will save you hours.

QREF is a comprehensive SuperBASIC cross reference facility. Identify the location and usage of any or all procedures, functions and variables in sorted order to any device with wild card selection. An essential tool for unscrambling someone else's code.

QLOAD, QREF and related extras are supplied on microdrive for **£9.95** or £6.95 when ordered with Q_LIBERATOR. Add £1 for 3.5in disk version.

Liberation Software

43 Clifton Road, Kingston upon Thames, KT2 6PJ Tel 01 546 7795

LEARNING WITHOUT BEING "TAUGHT"

KIDS

KINDERGARTEN INTERACTIVE DEVELOPMENT SYSTEM

A Menu-driven suite of four programs for grown-ups of any age to use with children from one to seven years old.

SHAPES. Displays one of six different shapes when its initial letter is typed in. Introduces the child to shape recognition, the words used for shapes, the position of six letters on the keyboard plus Enter.

CLOCK. Shows hands and clock face without numbers and asks what o'clock it is. Familiarises the child with the patterns of time telling, one-digit numbers and introduces a few two-digit numbers.

TABLES. Times tables from one to twelve. Correct answers in green, wrong ones in red. In addition to familiarising the child with patterns in arithmetic and two-digit numbers, introduces three-digit numbers.

WORDS. Type in the initial letter and the QL will show all the words it knows beginning with that letter. Familiarises the child with individual letters, links them with particular words of his or her choice, and begins familiarisation with the patterns of the words --- reading.

TEACH new words of the child's choice. Introduces the child to programming in Superbasic. Get the QL to REMEMber the new words. Build different VOCABULARIES for different children.

CATRPREP and BACKUP utilities included on Microdrive Cartridge.

Your QL is your business.
Now it can turn learning into child's play.

£12.50 inclusive.

Cheque or P.O. to:

pyjama SOFTWARE

39 RAILWAY ROAD, TEDDINGTON MX. TW11 8SD
01-977 6644

QL THOR
ATARI® ST
Amstrad PC
ORGANISER

EIDERSOFT OFFERS YOU MORE!

Full catalogue on request.

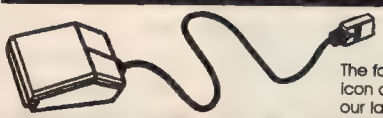
SUPPORT SERVICE

ESS offers you an amazing 20% discount off our published RRP's (except hardware and consumables). Full support in writing and a regular newsletter crammed with special offers and articles.

Now over 1500 members.

ESS + QL MOUSE SYSTEM £75

SPECIAL OFFERS!



The famous award winning ICE icon driven front end together with our latest superb mouse.

ESS + ANY GAME £17.95

Choose any of the games listed below to go with your ESS membership.

ESS ONLY £10.95

ICE SYSTEM

QL MOUSE Including ICE front end software. £45 trade in if you already own ICE. Postage £2.00	£69.95
ICE The award winning QL front end	£29.95
CHOICE SWITCHER	£16.95
ARTICE GRAPHICS	£14.95
ICICLE Icon control of your own programmes and the Psion packages.	£14.95
TOOLKIT	£12.95

QL SOFTWARE MART.

Qkick (disk only)	£24.95
Toolkit II	£14.95
Mandlebrot Magic	£14.95
Graphics Construction Kit	£14.95
Qwriter	£14.95
DP's Turbo Compiler	£79.95
Q Flash Ramdisk and tool kit	£17.95
QL Switch and Calculator + Basic	£16.95
10 Microdrive Cartridges + labels (10% ESS discount)	£17.95
Microdrive Labels 500 on Tractor Feed Colour	£4.95
White	£3.95
Floppy Diskettes (10) DDDS Only (10% ESS dicount)	£29.95

GAMES NEW!

Diffusion	£9.95
Full House	£12.95
BJ Returns	£10.95
Karate	£14.95
Spook	£10.95
QL Caverns	£7.50
Meteor Storm	£7.50
Games Pack (3 MD's 4 games)	£16.95

Please write or telephone for detailed information on any product.

QL DISK SYSTEMS Please telephone for an amazing price!

QL CONVERSIONS

QL → THOR THOR PC IF £599! Including Psion Xchange

QL → AMSTRAD PC 1512 AMSTRAD PC IF £499! Psion PC4 £69 extra

QL → ATARI ST ATARI 520 ST £399! with disk drive (1MB)

Please write or telephone for technical details and a full price list. All prices include VAT.

PSION ORGANISER From £99 Please write or call for a full colour catalogue.

15% Vat + Post Inc. (Except Mouse)

EIDERSOFT SOFTWARE LTD.

Overseas Add £1.00 Per Item Postage

The Office, Hall Farm, N. Ockendon, Essex RM14 3QH.

Telephone: 0708 851099.

All prices are subject to change

QL EDUCATION...

Until now we have been busy dealing with how to calculate percentages. It is time to start considering a different topic area. After all, computer teaching is not the reserve of the mathematics teacher. In this instalment Leslie Fahidy addresses the problem of teaching spelling by the use of a computer.

As soon as we start thinking about a spelling program, we notice that certain problems continue to arise. The first matter to be settled is how to present the question. Assuming that your QL has no voice output — it cannot speak the word in ordinary English which should be spelt by the student — how do we present the question? One possible solution might be deliberately to misspell a word and ask whether or not the spelling is correct and, if not, what is the correct spelling?

That avenue may certainly be investigated, and the reader is invited to do so, but be warned — there are some nasty problems to be solved on the way.

The important point to grasp is that, unlike with many mathematical problems, in this field we must first decide what we want to do and how. It is also important to realise that the solution is not so simple as it had been previously; generally, when you have a choice it usually leads to complications.

Natural reaction

Let us return to the decision of how to present the question. Did you have the immediate urge to take a pencil and a piece of paper, to jot it down? If you did, that was a perfectly natural reaction; you should have done so. As soon as we have a choice, as soon as the method of solution is not immediately obvious, we must make reasonably detailed plans of how we may achieve our objectives.

Without beating about the bush any further, let me tell you I have started to talk about algorithms. An algorithm is a planned method of solution which takes into account every conceivable contingency, every nasty exception to the rule, and gives us a plan to achieve our aim. There are other important criteria a good algorithm must fulfil but the definition given will be sufficient for our purposes.

So take a piece of paper and start writing the main points of our algorithm:

1. We will adopt the method of jumbling the required word on the screen and presenting it, together with a suitable clue. The student is then required to decipher it and input the correct word. If that is done we go to the next problem. If not, then we must say so, and give the correct solution.
2. Clearly, for the first part of our algorithm to work, we must store a number of words, with their clues, in the computer memory and let the computer choose at random. Inevitably that will lead to some of the words being presented more than once, and some not at all; we must accept that with good grace. If it worries us, we could always store such a large number of words that repetition is unlikely. There are also other ways to avoid repetition.
3. We must discuss the question of how the words will get into the computer memory. There are two possibilities — either with READ ... DATA statements, or we must put it in and save it to a data file before running the program. The second method is preferable. With READ ... DATA statements, all the words and their clues forming an integral part of the program, we are limited to just one set of words, while we may save as many data files on our Microdrive cartridge as we like, within reason.
4. We will have to handle one very important problem and it would be just as well to start thinking about its solution at once. It is the problem of lower-case versus capital letters. Some teachers maintain, justifiably, that the spelling of words should be learned with lower-case letters. In spite of this, if a child answers 'Dog' or 'DOG' instead of 'dog', are we to say it is incorrect? Clearly not, but bearing in mind how a computer compares strings, it will not accept that 'Dog'='dog'. So we must do something about it. We have to write a procedure which converts both the question and the answer to lower-case letters and it is those converted words which will be used in string comparisons.

Skeleton

The algorithm presented is only a skeleton. We must enlarge on it considerably to make it become really useful. Read through this algorithm — or your own, once you reach the stage of writing your own algorithms — look at every statement and ask if you would be able to translate the statement into your programming language.

There are three possible answers. If the answer is an unqualified yes, you have no problem — read the next statement. When you reach the stage of writing code for your particular computer language, you will be able to convert it without difficulty. If the answer is no, you must break down that statement of the algorithm into smaller steps — if you cannot translate the statement into the programming language you use, expand that portion of the algorithm.

For instance, statement 1 in our algo-

rithm may say jumble the word. There is no instruction in SuperBasic to enable us to translate that requirement directly, so we must break it down. Notice, however, that once you have written a procedure to do the task, called, say, 'JUMBLE', you may use it to achieve the task. So, when talking about algorithms, we are really talking about structure.

The statements of your expanded algorithm could be labelled as 1.01, 1.02, 1.03, and so on.

Finally, if the answer is MAY BE, it is only a question of how far do you trust yourself. This situation is likely to arise when a statement in the algorithm will translate into half-a-dozen or so instructions in SuperBasic. If you have tackled that kind of problem previously, go ahead and write the code for it. Otherwise, explain to yourself through a flowchart, how you will do it.

Flow charts

Another word has crept into our vocabulary — flowchart. I do not propose to go into it in detail but in the next instalment we will be drawing some flowcharts, so you will get the necessary experience.

I hope you have noticed how everything in this instalment ties with structure since we spent some time discussing structure in recent months. First, I talked about structuring the learning material in February. In last month's instalment, I told you about the structure of the program. This time, I am telling you that your whole approach must be structured if you want to solve problems beyond the trivial.

Even though I have given you something to think about along the lines of an algorithm for our current problem, and we have discussed some of the issues, I have not yet given you an algorithm. Presently I will give an algorithm for the task of inputting words and their clues and writing this input to a data file. We will discuss this algorithm. Finally, I will give you a program listing for the algorithm.

Here is the algorithm for the input routine:

1. Write messages on-screen and dimension necessary variables.
2. Decide to terminate the input by a 'rogue value'.
3. Input a word.
4. If the word is the rogue, continue at 7.
5. Input the clue to go with the word.
6. Go back to 3.
7. Enter the name and the drive number for a data file, to which the user wants to write the data.
8. Write to the data file:
   total number of words, in a loop; each word, followed by a '%' sign, and followed by its clue.
9. Close data file.
10. Exit.

On reading the statements of this algorithm, we find that no statement needs to be expanded, since all of them can be translated directly into a SuperBasic instruction, though expanding a statement is not something of which to be ashamed — if you feel the need for it, do it. For instance,

statement 1 says: 'Write messages on-screen and dimension necessary variables'. I know what messages I want to write on the screen and, having the program already available, I know which variables need to be dimensioned, but if you are in doubt, sketch the screen on a piece of paper and decide, not only what the messages should be, but also where each message should be displayed.

While the break-down of this algorithm is generally not needed, an explanation may not be amiss. The messages in statement 1 refer to the instructions to be given to the user; needless to say they may be constructed in a number of ways. The messages are printed by lines 120 to 150 in this month's listing.

What about dimensioning? In most versions of Basic, and certainly in SuperBasic, string arrays should be dimensioned before they are used. Two string arrays are used in the listing — word$ and clue$.

Since we have plenty of memory available, I decided to dimension each of them for 1,000 elements. That is the largest number of word/clue combinations you may enter with this program. In the unlikely event of you wanting to enter more words, alter line 220 accordingly. When dimensioning strings, you may also specify the length of each element of the array.

Bearing in mind that this is a spelling teacher, unlikely to contain long and complex words, I decided to dimension the length of each word to 15 and each clue to 50 characters. It is most unlikely that you will want to increase those figures but if you do you will have to change line 220 to reflect your wishes.

Rogue value

Statement 2 of the algorithm says terminate input by 'rogue value'. That might need a little explanation. Generally, when we start inputting data, we do not know how many words and clues are waiting to be input. We could count them, of course, but if we then input them in a FOR . . . END FOR loop, we would have to change the program every time there was a different number of data to input.

In situations like this, when you would really like to use a FOR . . . END FOR loop but you do not know how many times, the rogue value method is valuable. We choose an input which could not conceivably occur in context and that is the rogue value.

In our program I have chosen X (or x) for this role and the user is informed. 'If no more input then type X'. Clearly, we shall not ask our candidate how to spell the single-letter word X. Each input is checked by the program and when the rogue occurs the input sequence is terminated. So the program cycles between statements 3 and 6 until the rogue value occurs in the input; action is then transferred to statement 7.

In statement 7, starting at line 1070 in the listing, we ask the user to supply

the name of the data file and later the drive on which it should be located. Strictly speaking that is not necessary but it is useful. In its absence, all data files would have to be saved under the same name and on the same drive — the one selected by the programmer.

Which group?

The present arrangement enables us to input different lists of words and clues — perhaps for different age ranges or ability groups — and use whichever is appropriate. Similarly, in the main program, next month the user will be asked which data file he wishes to use and on which drive.

Possibly some further explanation is needed with respect to statement 8 in the algorithm. You may ask who do we want to record to Microdrive the number of word/clue combinations? So that, when loading that data file, we first load the number of data into a variable, say number, and then we may read all the data with a

```
FOR loop=1 TO number
INPUT£5, string$:REMark if we used channel 5
END FOR loop
```

loop. Incidentally, the same result could have been achieved using the EOF (End Of File) function; feel free to choose.

One more point in the algorithm might need clarification. It seems that we are writing each of the words and clues to the data file but each pair is separated by the '%' sign. It could be done in a different way, but it is faster to write one long string to the Microdrive rather than two short ones.

It would be economical on time, therefore, to combine pairs of words and clues into one string — I combined them into spell$ in line 1120 — and write them to the data file together. When reading it back, however, we must know where the words end and the clue begins; that is why I separated the two halves with a '%' sign.

A word of warning. You will often be required to write a sub-program, such as the one we have been considering this month, to enable you to input data for the main program to be written on a different occasion. You can never be sure that the input sub-program works correctly until after you have written the main program and you confirm that it does. I am in the comfortable position of knowing that my input routine works, because I have already written the main part of the program and I know it does. You, I am afraid, will have to wait to next month to see the main body of the program.

```
100 REMark THIS SECTION WRITES DATA TO A DATAFILE.
110 REMark input routine for spelling
120 CLS
130 AT 8,6:PRINT"Enter data as requested."
140 AT 10,4:PRINT"If no more input then type X."
150 AT 15,1:PRINT"Press any key to continue."
160 response$=""
170 REPeat waiting_loop
180  response$=INKEY$
190  IF response$<>"" THEN EXIT waiting_loop
200 END REPeat waiting_loop
210 CLS
220 DIM word$(1000,15),clue$(1000,50)
230 start
240 STOP
1000 DEFine PROCedure start
1010 CLS
1020 FOR input_loop=1 TO 1000
1030  INPUT"Word..";word$(input_loop)
1040  IF word$(input_loop)="x" OR word$(input_loop)="X"
      THEN EXIT input_loop
1050  INPUT"Clue..";clue$(input_loop)
1060 END FOR input_loop
1070 CLS:INPUT"Name of data file..";name$
1075 INPUT"Which drive to use..";drive$
1080 name$="mdv"&drive$&"_"&name$
1090 OPEN_NEW#4,name$
1100 PRINT#4,input_loop-1
1110 FOR printing_loop=1 TO input_loop-1
1120  spell$=word$(printing_loop)&"%"&clue$(printing_loop)
1130  PRINT#4,spell$
1140 END FOR printing_loop
1150 CLOSE#4
1160 END DEFine
```

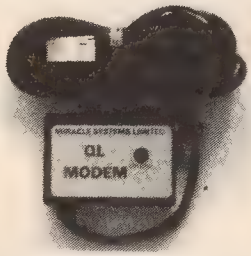
MIRACLE SYSTEMS LIMITED

14 day full money back guarantee on all products
12 month warranty on all products
All prices include VAT and P&P

QL MODAPTOR + £39

★Interfaces QL to any std. modem
★300/300, 1200/75, 1200/1200 baud
★Auto-dials with DTR
★Plugs into SER2
★Complete with software

QL MODEM £49.00



★1200/75—e.g. PRESTEL
★1200/1200 half duplex
★Autodial
★3 metre cable
★Plugs into SER2
★Complete with software
★Not BT approved

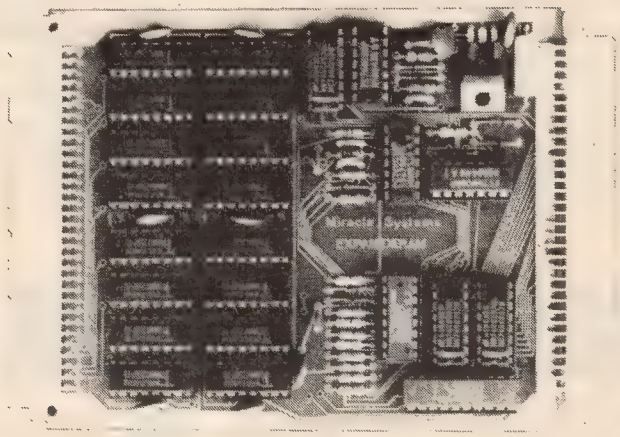
QL CENTRONICS £19.50

PRINTER INTERFACE

QL SERIAL CABLE £7.50

QL JOYSTICK ADAPTOR £4.99

QL EXPANDERAM 512K £99



★Increases QL memory to 640K
★Through connector for Disc Interface
★Low power consumption
★Can speed up some programs
★Able to use larger QUILL documents, etc
★Black cover included.

QL RAM DISC £14.95

★Configures RAM as Disc
★Speeds up some programs
★Supplied on microdrive
★Includes Spooler
★Includes Screen Dump

Access

Tel: (0454) 317772
Orders welcome by telephone or post

VISA

MIRACLE SYSTEMS LTD, 20 Mow Barton, Yate, Bristol BS17 5NF, UK.

Please send me .....
Please find a cheque enclosed to the value of £.....
or debit my credit card no ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐
Expiry date ☐☐/☐☐ Signed .....
Send to: Name .....
Address .....
.....
.....

MIRACLE SYSTEMS LTD, 20 Mow Barton, Yate,
Bristol BS17 5NF, UK.

Software Applications

Those who write programs and have elecronics experience will develop their own ways of making operations with the bundled QL software easier and quicker. Business users may not have such knowledge and may have little time to learn more than the rudiments of SuperBasic. Here are a few hints for such users.

First, what to buy. I regard each of the items listed as being essential for full utilisation of the QL. My work is primarily with Quill but most of these items are equally necessary for speedy manipulation of the other three packages. Mention of particular products does not imply criticism of others — I refer only to those I know.

Hardware
Extra memory (preferably 512K).
Disc drives (dual 3½ in, each 720K formatted capacity).
Disc interface, possibly combined with extra memory.
Firmware
Icon front end, preferably with mouse.
Toolkit, possibly in disc interface.
Software
Key- or icon macros.
Program switching.
Speller.

It is not sensible to give these items an order of importance. Their value varies with the work being done; £15 spent on a switching program can produce as much improvement as £400 on disc drives, in some cases. Suggested sources for the above are:
Memory
MP 256K internal — piggy-back — Eidersoft.
PCML 256K external — Eidersoft — or 512K — Sandy, both with disc interface.
Disc interface
PCML or Sandy, with Toolkit commands — Eidersoft, Sandy.
Disc drives
3½in. Mitsubishi or NEC, ⅓-height — Eidersoft.
Front end
ICE, preferably with mouse — Eidersoft.
Key- or icon macros
KeyDefine — Psientific Software, Transform.
Icicle — Eidersoft.
Program switching
Q_Switch — Transform.
Speller
Qspell — Eidersoft.

Go for the full 640K system. You are unlikely to find a full house too much. The software you buy for instruction macros, desk-top, mouse, will take a portion of memory — expect to lose up to 100K this way. Do not think that an extra 128K will allow you to have a Quill document 128K larger than you can get with your basic system — Quill takes any memory it can get and does not allocate all of it to documents.

Switching programs allow specific amounts of memory to be allocated for data with the Psion programs but you will find that the maximum file sizes you can get before overflow occurs are much less than the allocated spaces.

Expect to allocate 50–100 percent more memory than the size of your document files. External memory or internal? If you are mainly a Psion user, it is unlikely you would be able to notice much difference between the two types. The speed difference may be 10 percent or less in practice. Using the QL for much real computing may make the external add-on memory preferable, though. You cannot tell a program to use only external memory; the QL decides which areas of memory to use and they may not be the fastest.

The decision whether or not to buy disc drives is a similar one to that for extra memory. Your problem may be solved by either memory or discs but the need for discs is more pressing when you use Microdrives a good deal. The latter are a remarkable engineering feat and very convenient if you want to send data through the post, but they are not reliable or fast enough for jobs with a large I/O content and do not have sufficient capacity.

You can effect a big improvement in Microdrive speed by using the Q_Switch program. A comparison of saving times, first with just Quill loaded, then with a Q_Switch routine having Quill as its only job, gave save times for a 5,300-words file of 6½ minutes and 22 seconds, so Microdrives can be fast. The comparable figures to disc were 25 and 17 seconds. Microdrive copying can also be speeded considerably by the RAM-disc program Qflash.

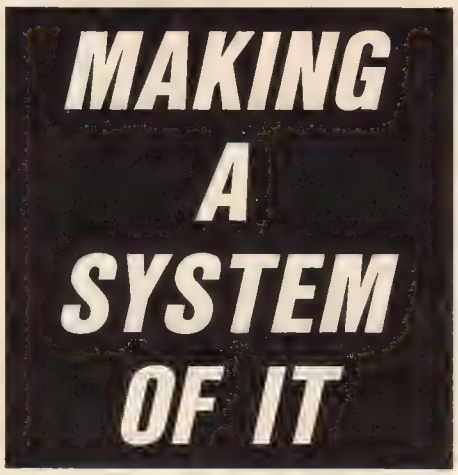
Spot the difference

Interfaces tend to have similar-looking specifications but significantly different performance. One RAM-disc routine may be much faster than another. Older designs use memory chips which are appreciably slower than current types. Extra SuperBasic commands may be supplied in the interface. Buy one which allows disc drives and extra memory to be connected, because you will want them both eventually. A parallel printer port may be helpful, unless you have already bought a serial/parallel converter; even then, it may be worth having the parallel port, because it will usually allow buffering of the output — faster printing — and in case other hardware has to be connected to the serial ports.

Firmware is software stored in such a way that it does not need to be loaded by the user. Having said that,

GETTING IT ALL TOGETHER Pt1

Bryan Davies has taken over the Software Applications list. Over the next few months he will show you how to make a working business system with your QL.



the various Toolkits available require user actions to load them but they are resident in chips rather than on magnetic media. The user types-in the command which activates the SuperBasic extensions in the toolkit. If you do not program, a toolkit may not offer you much but, if you want to use even one function from a tookit, such as a user-configurable clock, you must buy and activate the whole set; some recent versions allow activation of selected commands.

Of much greater use to the business user are plug-in ROM modules containing desk-top routines. The first such ROM to gain wide acceptance was ICE; it was good in concept and still serves well but it has remained essentially unchanged and other desk-tops have appeared offering more features.

The simplicity and speed of use of ICE still make it possibly the best choice for users having fairly straightforward requirements but those who need more features, and are prepared to spend the necessary menu time to get at them, should consider recent introductions, such as QATS and Taskmaster, both of which offer desk-top functions along with program switching. It is advisable to test drive any program which is an unknown quantity, especially if it sets out to provide all the facilities which were previously available only separately.

Macro merits

A macro program is essential for Psion users. Whether a blind type — Key Define — is preferable to a visual one — Icicle — or not is a matter of individual style and usage. There are a limited number of mnemonic possibilities available from the alphanumeric keys to assist your memory. You can use <ALT+L> for the Quill instruction <Load> but what if you want to load several different documents? Carrying this line further, if you want to deal with files which have long names, there is no way single-key macros will remind you of several of them.

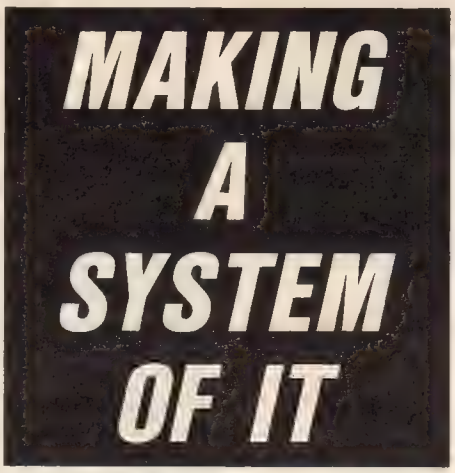
In this situation, icons are preferable; you draw a picture to represent the file/operation and put text with it. I update five Abacus files at infrequent intervals; apart from remembering the file names, I need to be able to Load/Save all five files from/to three devices. It is not possible to identify five files × two commands × three devices simply and effectively with single-key macros, so I use the Icicle program, which allows up to 27 macros with picture/text icons, and a further 27 with just text.

The merit of a key macro program is speed of operation. One master key, typically ALT, and one other key can activate the Psion commands, or enter data. If an icon program with mouse or cursor keys is used for the same operations, you have to move the mouse and press buttons several times, especially if the required icon is not on the first page to appear. Either way, you save a good deal of time and effort compared to calling the same functions by keying them in character by character.

Switch on

Switching routines operate properly only on programs which are started by EXEC_W rather than by LRUN or EXEC. The Psion programs are in this category but difficulty might be encountered if programs such as Editor and ARCHRTM are included in a switching routine, because they start running as soon as they are loaded and do not allow the switching program to return to other programs.

SuperBasic programs cannot be switched, because the QL interpreter chip allows only one of those programs to run at a time but Q_Switch and Taskmaster allow you to return to SuperBasic at any time. Switching routines may occupy only a few K but you can soon find you have run out of memory when you run several programs simultaneously.



Check switch program features carefully before buying, to make sure that you will be able to do what you want in your system memory. Q_Switch requires 4½K per switching routine and four programs can be tasked by each routine, the only limit to the number of routines in use being system memory. Taskmaster takes about 80K but is a rather different program, providing housekeeping routines as well.

There is not much to say about spelling checking programs — only one is on offer. Qspell has been around for a year or so and has notched sizeable sales. For most users, it will be adequate with its basic dictionary of 25,000 words covering most standard text. It is a pity software suppliers, including the one producing the program, do not make more use of it.

If you use many unusual words, there is a problem; for Microdrive users, it may be as simple as the size of the dictionary reaching the capacity of a cartridge. The basic file takes 63K and that may have increased to 100K by the time you have reached 30,000 words. Around that level, the dictionary seems to become corrupted, especially if the supplied compression routine is utilised.

Do not believe you have no need to check your spelling — you may be able to spell every word correctly but that does not mean you will type them so. Qspell is a good proof reader; all my work is proofed by humans at least twice but Qspell still manages to find a few errors. It cannot be run as a multitasking job, unfortunately.

Information

ICE, Icicle, Qspell, CHOice, Qflash, PCML 256K disc interface, MP 256K internal memory, NEC disc drives
Eidersoft
The Office
Hall Farm
N. Ockendon
Upminster
Essex RM14 3QH.
Tel: 0708 851099

Q_Switch, Key Define
Transform Ltd
24 West Oak
Beckenham
Kent BR3 2EZ.
Tel: 01-658 6350

Key Define
Psientific Software
37 Cottesmore Road
Hessle
North Humberside HU13 9JQ.
Tel: 0482 649187

Super Q 512K disc and printer interface
Sandy (U.K.) Ltd
Unit 33
Murdoch Road
Bedford MK41 7PQ.
Tel: 0234 219814

Taskmaster
Sector Software
39 Wray Crescent
Ulnes Walton
Leyland
Lancs.
Tel: 0772 454328

QATS
Cope
3 Langham Mansions
Earls Court Square
London SW5 9UH.

BETTER BASIC

The primitive QL editing suite can be enhanced considerably by a few short procedures. Mike Lloyd shows how.

Commands such as AUTO and DLINE which help programmers to write Basic programs are known collectively as the editing suite. The way in which these commands work, together with the presentation of a program listing on the screen, is known as the editing environment.

Some editing environments are very complex, using icons and transient windows to offer sophisticated facilities. Some computers offer full screen editors which do not use the concept of a command window. Some editing environments, including those of the QL, are very primitive. Conversely, the QL has one of the best Basic dialects of any small computer. QL programmers can tailor many of the existing editing commands to produce an editing environment which more closely meets their personal requirements.

The editing command which most needs improvement is LIST. It is verbose, clumsy and unhelpful. Programs can be listed in their entirety by entering LIST without parameters, perhaps pausing in the listing by using the CTRL-F5 key combination. With long programs containing hundreds of lines this is unworkable, therefore LIST can be followed by parameters to declare which lines of the program are to be displayed. For example,

LIST 500 TO 599

lists all program lines between line 500 and line 599 inclusive. While useful, this command involves no fewer than 15 keypresses and other examples can comprise up to 19 characters.

If a programmer was hunting for a particular area of a program, LIST would have to be used repeatedly with a series of different parameters until the correct part of the program was found.

An alternative strategy is to use LIST in a user-defined procedure which has a single character name and which takes only one parameter, thus reducing the typing required to an absolute minimum. The procedure — see listing one — constructs and implements a suitable LIST command based on the single parameter.

Listing 1

```
100 DEFine PROCedure l (x)
110 CLS#2
120 PRINT#2,"SEGMENT" !x \\
130 LIST x*100+(x=0) TO x*100+99
140 GO TO 32767
150 END DEFine l
```

The procedure is fairly unremarkable in its construction but dramatic in its impact on programming techniques. The parameter represents the line number at which listing will begin. Because large line numbers will tend to be used as a matter of course and because listings could easily start at a round hundred, the parameter is the start line number divided by 100. The end line number is found by adding 99 to the start line number. This means that to duplicate the 15-character LIST command the following command, only three keypresses long, is required:

L 5

The construction of the LIST command in the

Listing 2

```
200 DEFine PROCedure lp
210 LOCal x
220 CLS#2
230 PRINT#2; "PROGRAM SEGMENTS" \\
240 FOR x=1 TO 50: LIST x*100
250 END DEFine lp
```

Listing 3

```
300 REMark File Renumber Utility
302 CLS#0
304 d$ = "mdv1_"
306 PRINT#0; "Create Renumbered Basic File"
308 INPUT#0; "Enter SOURCE name: " &d$; f$
310 OPEN_NEW#3, d$ &f$ &"_tmp"
312 OPEN_IN#4, d$ &f$
314 INPUT#0; "Enter START LINE number:"!count%
316 AT#0, 0,0: CLS#0,4
318 PRINT#0; "Copying line..."
320 REPeat loop
322   IF EOF(#4) THEN EXIT loop
324   INPUT#4, a$
326   gap = " " INSTR a$
328   AT#0, 0,16: PRINT#0, a$(1 TO gap),
330   IF a$(gap+1 TO gap+6) = "DEFine"
332     count% = (count% DIV 100 +1) *100
334     ELSE : count% = count% +5
336   END IF
338   a$ = count% & a$(gap TO)
340   PRINT#3, a$
342 END REPeat loop
344 CLOSE#3: CLOSE#4
346 DELETE d$ &f$
348 COPY d$ &f$ &"_tmp" TO d$ &f$
350 DELETE d$ &f$ &"_tmp"
352 PRINT#0; "Final line = "; count%
354 STOP
```

Listing 4

```
400 DEFine PROCedure c8
410 WINDOW   448, 200,  32,  16
420 WINDOW#0,448,  40,  32, 216
430 WINDOW#2,448, 200,  32,  16
440 PAPER    2: INK    7
450 PAPER#0, 0: INK#0, 7
460 PAPER#2, 1: INK#2, 7
470 MODE 8
480 END DEFine c8
```

procedure is made slightly more complicated by the need to avoid listing line zero. If the command L 0 is entered, the listing is made to begin at line 1.

There is a further complication imposed by Qdos because it does not like some commands, including most of the editing suite, being used within procedure definitions. If a program were halted while a procedure or function was being interpreted and then a listing obtained

Listing 5

```
500 DEFine PROCedure c4
510 WINDOW    256, 202, 256,   0
520 WINDOW#0, 512,  50,   0, 206
530 WINDOW#2, 256, 202,   0,   0
540 BORDER    1, 246: PAPER    2: INK    7
550 BORDER#0,       0: PAPER#0, 0: INK#0, 4
560 BORDER#2, 1, 246: PAPER#2, 7: INK#2, 2
570 MODE 4
580 END DEFine c4
```

using the L procedure, an attempt to edit a line would produce the error message "not implemented". Repeating the command would clear the problem and the required line would be displayed in the command window as normal.

To eradicate this annoying foible it is necessary to commit a heinous sin in structured programming terms, and that is to use GOTO, which alone is bad enough, to jump out of a procedure definition, which is usually unforgiveable. By directing program flow to the last line of a program, Qdos is confused into thinking that it is not working with a procedure definition and therefore the EDIT command can be used without difficulty.

The procedure begins by clearing the listing window and printing a short message to indicate what is being displayed. Further embellishments could be included, for example to set border and paper colours.

In effect, this procedure introduces the concept of dividing listings into segments which can be imagined as pages. Page 1 of a listing would contain line numbers from 100 to 199 inclusive, page 7 would contain lines 700 to 799, and so on. This is a useful improvement on LIST but scarcely provides the dramatic impact on programming habits promised.

If each page contained a single procedure or function definition it would encourage the use of procedures and functions as a matter of course; it would improve their readability by showing just one procedure or function at a time and it would be easier to find one's way around lengthy programs.

Listing two takes advantage of the paging concept to produce a list of all the procedure and function definitions in a program by listing each line number divisible exactly by 100. Entering the procedure name — lp is short for List Procedures — produces output similar to this:

```
100 DEFine PROCedure l
(x)
200 DEFine PROCedure
lp
300 REM main body
400 DEFine FuNction test
(x, var$, value)
500 DEFine PROCedure
quit
```

The procedure depends on the program being numbered appropriately initially. With a little care when choosing line numbers time will never again be wasted in long searches for a particular definition or in typing verbose LIST commands.

The third listing is a utility which can be used to re-number existing programs into 'pages' but it is of value only if programs are properly structured by using user-defined procedures and functions. RESTORE commands will need to be re-numbered by hand. GOTOs and GOSUBs are also not re-numbered, but they have no business to be in a structured SuperBasic program.

Finally, a further enhancement of the QL programming environment can be achieved by changing the position and sizes of windows. SuperBasic lines tend to be short, especially where multi-line versions of control structures are used. The listing window is therefore best arranged to be as long as possible but not necessarily as wide as its default setting. It is also helpful to have a procedure which restores window settings if they are changed in a program.

Listings four and five are procedures which set the screen windows to their default settings in TV mode and monitor mode respectively. The procedures are called C8 and C4, referring to the number of colours available in each mode.

Listing six, C0, is a revised setting of the default windows in Monitor mode to make better use of the screen. The listing window is 37 characters wide — the same as the default width in TV mode — but a useful 25 lines deep. The main window is of identical proportions to the default TV mode setting, allowing graphics to be displayed as they would appear in a program running in TV mode. The remaining area is used by the command window. Because it is much deeper than normal, commands remain in the window for longer than usual.

The procedures are best used by saving them in a file, perhaps a BOOT file, and merging them with programs undergoing development. As with all utility listings, the procedures should be re-numbered with high line numbers to avoid conflicts with other program lines.

Other possibilities should suggest themselves to amend or supplement these procedures to overcome the shortcomings of the existing editing environment and make it equal the power of SuperBasic. The main considerations should be to reduce typing to a minimum and to provide helpful facilities using as little memory as possible.

Listing 6

```
600 DEFine PROCedure c0
610 WINDOW    284, 126, 228,   0
620 WINDOW#0, 284, 115, 228, 126
630 WINDOW#2, 232, 256,   0,   0
640 BORDER    2, 0: PAPER    2: INK    7
650 BORDER#0, 2, 0: PAPER#0, 4: INK#0, 0
660 BORDER#2, 2, 0: PAPER#2, 7: INK#2, 2
670 MODE 4
680 END DEFine c0
```

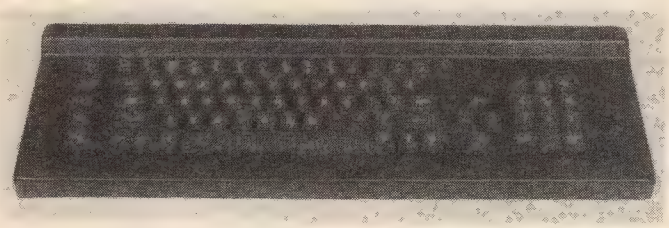
● *Next month's article continues this theme with some file access routines.*

AT LAST!

A REAL KEYBOARD FOR THE QL

THE RAINBOW KEYBOARD

A PROFESSIONAL 'FEEL', SEPARATE KEYBOARD WITH 81 FULL TRAVEL KEYS INCORPORATING CURSOR AND NUMBER PADS. SIMPLE TO INSTALL. FULLY COMPATIBLE WITH ALL SOFTWARE.



£69.95 + VAT

PLEASE ALLOW 28 DAYS FOR DELIVERY

QL REPAIRS

FROM **£17.95**
Phone for quote

BATTERY BACK UP FOR REAL TIME CLOCK
Maintains the date and time while the QL is off

KIT **£19.95**
FITTED **£26.95**

640K MEMORY UPGRADE

KIT **£110.00**
FITTED **£125.00**

Overseas enquiries welcome

RAINBOW Digital Repairs

BUSINESS & HOME COMPUTER REPAIRS
Clark House, Haxby, York YO3 8HU. Tel: (0904) 768853

SUPERTOOLKIT II & QLIBERATOR COMPILER "Special Offer"

CARE Electronics is proud to announce an UNBEATABLE combination. The ULTIMATE QL enhancement with the DEFINITIVE COMPLETE SUPERBASIC Compiler.
The BEST team at the BEST PRICE. AVAILABLE NOW!!

Q Liberator & Supertoolkit Eprom ..... @£ 74.75d
Q Liberator & Supertoolkit micro drive ..... @£ 72.45d

QL SUPERTOOLKIT II by Tony Tebby

Over 118 Commands:– Full Screen Editor, Print Using, Last Line Recall, Altkey, Job Control, File Handling, Default Directories, Extended Network
16K Eprom Cartridge Version ..... @£ 29.90d
Configurable Version on Microdrive ..... @£ 28.75d

Q LIBERATOR COMPILER

Compiles any Superbasic program, Pipes, Job communication, Error trapping etc.
Microdrive Version ..... @£ 59.80d
3.5" Disc Version ..... @£ 59.80d

SANDY PRODUCTS

Sandy SuperQboard (512k, TOOLKIT II etc) ..... @£215.00d
Sandy 512k THRU-CARD & QJUMP Ram Disc ..... @£ 99.00d
Sandy 512k THRU-CARD & QRAM Front end ..... @£126.50d
Sandy Disc+Printer Interface+Utilities ..... @£ 88.09d
SUPER MOUSE/SUPERQBOARD:
Qram Multitasking Front End By Tony Tebby
Quality Mouse, 512k RAM, SUPERTOOLKIT II, Disc & Printer Interface, Cadpak Graphics Complete with Utilities ..... @£299.92d

QL HARDWARE

Care Eprom Cartridge (each) ..... @£ 6.90c
QEPIII QJUMP Advanced Eprom Programmer ..... @£120.75d
Eprom 27128 250n/s 16K ..... @£ 4.14c
Sinclair QL 128K Computer ..... @£138.00a
Sinclair QL 640K Computer & Ram Disc ..... @£230.00a
Single 3.5" Disc Drive & (Own PSU) ..... @£125.35a
Dual 3.5" Disc Drives & (Own PSU) ..... @£198.95a
RGB conversion kits (TV to TV/Monitor) ..... @£ 57.50d
Philips & Pye TV's Only
Tandata Complete QL Modem set ..... @£ 89.70d
QL Keyboard Membrane ..... @£ 13.80d

MAGNETIC MEDIA

Microdrives (Pkt 4) ..... @£ 7.91c
3.5" (each) ..... @£ 2.76c
3.5" (per 10) ..... @£ 25.30c

"CANON & TAXAN PRINTER OWNERS"

A NEW QL TEXT PROCESSING PACKAGE. PRINT ANY CHARACTER FONT FROM WITHIN QUILL. AVAILABLE WITH 12 STANDARD FONTS INCLUDING OLDE ENGLISH, GREEK, MATHS ETC. WITH UTILITIES. PLEASE PHONE FOR DETAILS

TONY TEBBY Software (QJUMP)

QRAM "new" COMPLETE QL MULTITASKING FRONT END.
A TRULY AMAZING DEVELOPMENT FROM QJUMP.
POP-UP MENUS, FAST RAM DISC, UTILITIES, HOTKEYS, SCREEN/WINDOW DUMPS, PRINT SPOOLER ETC ..... @£ 29.90d
RAM Disc, Software ..... @£ 8.05c
QLFP (Micro/P Disc Interface Upgrade) ..... @£ 14.95c
QMON II Microdrive ..... @£ 19.95c
QMED (Medic disc interface upgrade) ..... @£ 14.95c

ZITASOFT Software (by Steve Jones)

Locksmith copies 99% of protected programmes.
M/DRIVE – M/DRIVE Sold for LEGAL use ..... @£ 11.50c
4Matter + Locksmith copies 75% of protected programmes M/DRIVE – DISC ..... @£ 23.00c

COLIN OPIE Software

Character Font & Editor ..... @£ 10.35c
Cross Assemblers 6502/ or 8048 ..... @£ 23.00c

MONITORS 85 Characters (Price incl lead)

Philips BM7502 Green Hi-Res ..... @£ 89.70a
Philips BM7522 Amber Hi-Res ..... @£ 92.00a
Philips CM8533 Colour Med-Res ..... @£289.80a
Hantarex HX-12 Green Hi-Res ..... @£ 79.50a

READYMADE LEADS

RGB QL DIN to Phono ..... @£ 5.29c
RGB 8–6 pin DIN ..... @£ 5.29c
RGB 8–7 pin DIN (Hitachi) ..... @£ 6.90c
RGB 8–7 pin DIN (Ferguson) ..... @£ 6.90c
RGB 8 pin to SCART (Euro) ..... @£ 9.20c
6 way PCC–25 way 'D' (Printer-Ser1) ..... @£ 9.20c

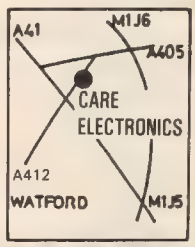
QL GAMES

AMBITION By Way Ahead ..... @£ 14.95c
Business Orientated Strategy "Super Monopoly"
YAHTZEE ..... @£ 9.20c

CARE ELECTRONICS

OPEN
9am-5pm Mon-Thu
9am-4pm Fri-Sat

800 ST ALBANS ROAD,
GARSTON, WATFORD,
HERTS. WD2-6NL.
Tel: 0923-672102



NEW PRODUCT AVAILABLE
QLIBERATOR & TOOLKIT
QRAM FRONT END
YAHTZEE GAME

HOW TO ORDER: ALL PRICES INCLUDE VAT

By Post. Enclose your Cheque/P.O. made payable to CARE Electronics. Or use ACCESS/VISA. Allow 7 days for delivery. Please add carriage.

a–£10.35 b–£5.75 c–£1.15 d–£2.30

Ram Packed

QRAM is a menu-orientated modular front-end system. Ron Massey describes exactly what that means.

Released somewhat later than anticipated, *QRAM* utilities from QJump have finally arrived. Supplied in a much expanded form, QRAM now consists of a suite of programs supporting the main windowing and controller utility.

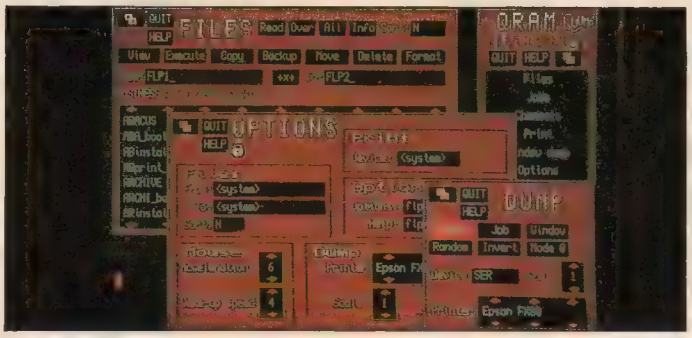
A menu-orientated, modular front-end system, QRAM incorporates six main menus, with additional sub-menus for controlling the QL operating environment. Option selection may be made from the keyboard using cursor keys and <SPACE> bar to select menu icons and directory items, by using the first letter of the word in any of the command boxes or by using any of the hotkeys such as <ESC> <F1> and others to choose particular functions.

QRAM also supports its own mouse system, also available as an in-bulit feature of the new Sandy *Super-Q-Board,* with which cursor movement is impressive. Users not having the mouse system can use the pointer controller file supplied with QRAM.

Each main menu offers the options of QUIT, closing that particular menu; HELP, and an over-lapping window-icon which, when selected, allows the current menu to be moved elsewhere on screen.

When more than one menu is present on-screen, the cursor over the most recently-called menu is indicated as an arrow. Moving over any previously-called menus still on-screen, the cursor is indicated as a lock. If <SPACE> — or mouse button — is pressed with the lock-cursor over a menu, that menu is brought forward and becomes the current menu.

Although a highly-complex program internally, QRAM has a well-designed user interface, without sacrificing any of its inherent versatility. Pressing the default hotkey, <ALT> </>, calls the QRAM Main menu for Files, Jobs, System Channels, Print Spooler, Window Dump or Default Options.



Multiple menus with QRAM.

Selecting "OPTIONS" first offers the opportunity to change System Defaults for drives, printer ports, file display sorting order, printer driver and dump scale. Once satisfied with the default settings, selecting QUIT closes the menu. Pressing the QRAM HOTKEY again returns you to the Main menu.

Filing is what computers are about and the QRAM file processing capability is exceptionally comprehensive. Selecting "FILES" from the Main menu provides a complete range of file-handling commands consistent with Toolkit II.

Access is made to both drives and, where a medium is present in either or both, the menu lists the directory — according to the Sort Order — of the source drive by filename, size, date, time and whether they are Executable or not, with the statistics of the destination drive below its ident box. Drives can be disc, RAM disc or Microdrive. Wild-card entries, as used with Toolkit II, are fully-supported.

If the symbol separating the source and destination ident boxes is selected, the source and destination drives are transposed and the file window shows details of the files from the transposed drive. The directory list may be scrolled, temporarily re-sorted, all or individual entries which are highlighted may be selected, for further processing.

Selecting the VIEW option, a second window is opened over the FILES menu. Each of the selected files, in turn, is presented in the VIEW window. Options are available to view the file in truncated form, the default, or, by selecting the WRAP command, file lines are shown in their entirety. Document viewing is control led by menu selection of Line,Page,Repeat, or Next document in the queue.

The QRAM HOTKEY facility can be used with any pure executable program to produce "pop-up" applications. As of this writing, Qliberated programs are the only compiled programs which will work with QRAM.

Other QRAM features include Microdrive emulation, a background printer spooler and a reasonably good screen dump, supporting 11 monochrome and colour printers, each of which can be set to produce a dump at two or three scales.

QRAM, also the intended front-end for the Sandy *Futura,* will run only on expanded QLs. Files connected to the QRAM system are more than 45K in length, not including dataspace or elbow room requirements, once up and running.

This superb utility is what is euphemistically referred to as "still under development". QJUMP offers current QRAM users the opportunity of obtaining upgrades as and when they become available.

One of the major additions planned for future releases is user access of the window routines used by QRAM. Other useful improvements will be an option to select screen dump density, alter menu sizes and many more. I would also like to see the option of printing whole or selected file directories.

WDSoftware

FOR THE SINCLAIR QL:-

JOSS **£15 on mdv or 5¼" flp, £17 on 3½" flp**

Forget syntax errors and mistyped names in file commands! Just move a cursor and press SPACE. Cursor keys or joystick allow access to up to 8 microdrives and all the discs your interface will handle, with up to 150 files on each. Scroll & print directories, COPY, DELETE or PRINT any file, select TV or Monitor mode before LOADing/RUNning a program. Use keyboard only to set date or label a medium. Easy to use with **Psion** or other software. No silly icons to learn – JOSS will tell you what it's doing! Mass copying/printing utilities and programmer's toolkit. Specify disc size, tracks and interface **(CST, Cumana, PCML, MicroPeripherals)** or microdrive only.

RefQL7 ..... £11 on 2 mdvs or 1 3½" flp, £9 on 5¼" flp

For use with **ARCHIVE 2,** contains 1300 useful references and a search/print program. Find programs, articles and reviews buried in the magazines on your shelf! Cheap updates of earlier editions.

Mdv Extension Cable (8" £5.50

Add ZX Microdrives to your QL.

Joystick Adaptor £4.99

FOR THE QL, SPECTRUM, (ALL), BBC & ELECTRON:-

WD Morse Tutor **£4 cassette, £6 mdv or 5¼", £8 3½"**

Teach yourself to read Morse Code. From absolute beginning to 18 wpm! Feedback on screen or printer. Random letters, numbers or mixed, 100 random sentences, many helpful features include phonetic speech via Currah Micro-Speech (Spectrum). Discs unsuitable for BBC B+.

We export hardware and third-party software. Ask for lists

PAYMENT:-

In advance, in **STERLING** on British bank branches, international Giro, Postal Order or **ACCESS/MasterCard.** Add £1 outside Europe for AIRMAIL.

FROM:-

WDSoftware (QLW),
Hilltop, St Mary, Jersey, C.I. Tel: (0534) 81392

VIEWPOINT

TRUE THREE DIMENSIONAL CAD FOR THE SINCLAIR QL

VIEWPOINT is a sophisticated design and educational package which enables you to:

★ Construct a 3D wire-frame image from two dimensional drawings, using lines, rectangles, boxes, circles, spheres and polygons.
★ Rotate and translate the completed image within a spherical polar coordinate system.
★ Zoom in/out and change perspective.
★ Use hidden line removal on single convex polygons to enhance the final view.
★ Save the finished object to cartridge or disc, either as a 3D set of coordinates or as a machine code subroutine accessible from SuperBASIC.
★ Dump the finished drawing to any printer.

VIEWPOINT is now in execable code and will multitask.

"An exceptionally well planned 3D modelling program, incorporating powerful professional illustrator's features and a number of superb demonstration files." – *Sinclair QL World,* Dec.

"This is one of the best (QL graphics programs) I've seen. Now you can really play with three dimensions" – *QNET2.*

VIEWPOINT IS AVAILABLE ON CARTRIDGE FOR £19.95 and 3·5" DISC FOR £24.95

DRAGONHOLD

Still one of the best and most difficult games around for the Sinclair QL, DRAGONHOLD is now ONLY £14.95 on cartridge and £19.95 on 3·5" disc. ". . . of its type, it's certainly better than anything else around on the QL" – *Your Sinclair.* "Highly recommended" — *Popular Computing Weekly.* – ★★★★★ Sinclair User. "A well put together adventure." – *Sinclair QL World.*

Available from all leading QL dealers or send cheque or P.O. to

RUBICON MICROS

11 Bannerdale Road, Sheffield S7 2DJ
Tel: 0742 583665

All goods are despatched by first class return

★ QL SOFTWARE ★

KEEPING THE PRICES LOW

★ CHARACTER TOOLKIT £5 ★

This package contains all you need to create and use your own character sets on your QL. It also contains routines that allow you to print characters of an infinitely variable size anywhere on the screen. To help you design your characters sets we have even included a special designer program which makes it even easier.

★ ICON TOOLKIT £5 ★

This package contains all you need to turn your QL into an Icon controlled super micro – takes the tedium out of typing; unlike some systems, ours is fully programmable. You can program the Icons to do anything you like – you can of course redesign the Icons themselves and we have even included a special designer program to make the task that bit easier.
This toolkit also contains lots of new graphics commands, all of which have the ability to draw using user defined patterns, not just solid lines. There is even a new fill command that will fill any shape with any user defined pattern (features like these are normally only to be found in the most expensive of drawing programs). We even throw in a special pattern designer so that you can design your own new patterns at leisure.
There are also 2 Epson compatible screen dumps, a print spooler and an on screen notepad.

★ GAME TOOLKIT £5 ★

This toolkit contains everything you need to create fast animated arcade games on your QL. It also contains extra routines to allow you to produce multi-tasking tunes (like the ones found in all the best arcade games). You can have up to 32 sprites all of which can have up to 16 frames of animation. Collision detection is also provided and of course it goes without saying that our sprites are some of the fastest and smoothest around. A sprite designer is also included.

★ COMPLETE TOOLKIT £10 ★

All three toolkits on one cartridge offering a substantial saving – probably the best toolkit ever!!!

★ SOUND EXPERIMENTER £5 ★

This is probably one of the most original and interesting packages ever written for the QL. Using this package you can turn your QL into a sort of primitive digital synthesiser. The package actually allows you to draw sounds on your QL screen and then play them back either forwards or backwards in whole or in part, so if you're at all interested in sound synthesis or you just like making silly noises then this is the package for you, and there is also a special program included to help you get better aquainted with the super basic beep command (saves hours of messing about trying to find the sound you want).

★ BLOBZ £3 ★

THE RUBBERISED ASTEROIDS GAME – ADDICTIVE ARCADE ACTION

Send cheques or P.O.s to:

SMILING SOFTWARE
10 Fir Road, Marple, Stockport SK6 7QN (89)

DS ENTERPRISES

Dual 3.5" Drives	£210.00	Dual Drives & CST Interface	£275.00
Dual Drive & 512k Interface	£400.00	Single Drive & CST	£200.00
Citizen 120D Inc All Leads	£225.00	Miracle Sys 512k	£114.95
Miracle Sys Modem	£47.50	M/S 512k & Ram Disk	£125.00
Sinclair QL 1 Year Service Contract and Four Free Books	£135.00	Cub Microvitec	£270.00
		Schon Keyboard	£52.95

Used Microdrive cartridges (While Stocks Last)
10 For £11.50 ..... 20 For £19.95 ..... 50 For £45.00

Books ..... Full Set of Nine Hutchinson QL Books For Only £19.95 Or £2.95 Each

Sign Designer	£18.95	Ram Disk (World's Fastest)	£14.95
(QL World Recommended)		(QL World Recommended)	
Multi Task	£14.95	Eye-Q	£27.50
QL Paint	£19.95	Jabber	£9.95
Quboids	£9.95	Chess	£15.95
Meteor Storm	£9.95	Metacomco Assembler	£29.95
Computer One Monitor	£14.95	Lattice C	£84.95
Pascal	£74.95	Cash Trader	£39.95
Quill Adventure Writer	£19.95	Media Manager	£34.95
Supercharge	£48.50	Professional Astrologer	£48.50

All Products Subject To Availability

Please Find My Enclosed Cheque For.....

Rush me.....

My Name.....

Address.....

.....

DS Enterprises, 25 Trinity Rise, London SW2 2QP. Tel: 01-671 0209
ACCESS & BARCLAYCARD TAKEN
CALL FOR DETAILS OF NON-ADVERTISED PRODUCTS

QL CONNEXIONS

Colin Opie continues our in-depth interfacing project by looking at supporting file structures and directories.

Having begun to look at device driver specifications for simple devices which cannot cater for directory and file structures, in the fifth part of the series we finish our discussion of those drivers and then start to look at drivers which can support file structures and directories — e.g., RAM and floppy discs.

At various points reference will be made to certain Qdos 'TRAP' calls, i.e., the normal Qdos operating system calls. If you need a full description of any of them, refer to *QL Assembly Language Programming* published by McGraw-Hill (U.K.). Writing device drivers and other advanced input/output code requires knowledge of more dedicated Qdos calls. They will be dealt with in a future part of the series.

If all that seems heavy going, do not worry for now. Soon we will be moving to our first Qontrol II input/output board. It contains a ROM which supplies you with extensions to SuperBasic to give you a Control-SuperBasic. If you never want to write your own device driver and want only to control programs in Basic, this is the board for you. In any event, the input/output board will be of use because of its potential. We will also be looking at how the ROM was written, so that those who do want to design boards will have a concrete — well silicon, anyway — example of how to do it. All this preliminary theory will then come to life.

We saw in part four there are three fundamental access layer calls for standard device drivers. There is one call for data I/O, one for channel opening, and one for channel closing. Let us look at each of the calls in more detail to see how we might write our access layer code. All access layer calls are in supervisor mode.

Channel Open

On entry to this access layer code the following registers will be set, in addition to the normal settings for A3, A6 and A7:

A0 Pointer to supplied device name
D3 Key giving 'open' access code
(refer: TRAP #2, IO.OPEN)

All channels are implicitly bi-directional and, therefore, it is for the device driver to trap illegal access codes — e.g., OPEN_IN from a Centronics-compatible printer device.

Four common errors should be checked for and returned to D0 (long-word) if they arise. ERR.0M (-3) indicates that there was not sufficient memory to allocate space for a new channel definition block. ERR.NF (-7) will indicate that the supplied device name was not recommended. ERR.IU (-9) indicates that the device is in use and may not be shared, and ERR.BN (-12) will indicate that the device name was correct but the parameter list was illegal. If an error is found, the channel should not be opened. If no error is detected, D0 must be returned to zero and the order of operations performed by an open channel routine will be:

a) Decode the device name — see utility IO.NAME later.
b) Allocate space for channel definition block in common heap area — see utility MM.ALCHP later.
c) Initialise channel definition block workspace, i.e., from offset $18 onwards.
d) Return base address of channel definition block in register A0, and error code zero in register D0.

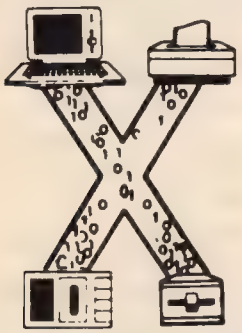
Data I/O

An I/O access layer routine will be called when an I/O TRAP to the appropriate channel is executed. The layer will be called initially at the time of the I/O TRAP call. If the operation cannot complete on the first call, an attempt will be made to call the access layer routine on every scheduler loop. That will continue until the operation is complete or it times out.

All channels are implicitly bi-directional and, therefore, it is for the device driver to trap illegal operations — e.g., input from a Centronics-compatible printer driver. The I/O TRAP #3 calls which may be supported by a standard device driver are shown overleaf.

Handler	Code	Description
IO.PEND	$00	Check for pending input
IO.FBYTE	$01	Fetch a byte
IO.FLINE	$02	Fetch a line (terminator LF)
IO.FSTRG	$03	Fetch a string of bytes
IO.EDLIN	$04	Edit a line (console control)
IO.SBYTE	$05	Send a byte
IO.SSTRG	$07	Send a string of bytes
FS.HEADS	$46	Set file header
FS.HEADR	$47	Read file header
FS.LOAD	$48	Load a file
FS.SAVE	$49	Save a file

On entry to this access layer I/O code register D0 will contain one of the TRAP codes shown. Appropriate additional information will be in registers D1, D2, D3, A1 and A2. Registers A3, A6 and A7 will contain their standard values for device



driver accesses. Register A0 will contain the base address of the channel definition block.

On exit, registers D1 and A1 should be set accordingly — refer to appropriate descriptions of the TRAP #3 I/O calls. The I/O sub-system (IOSS) will maintain the returned values in D1 and A1 and use the original values for D0, D2, and A2 between scheduler loop calls if such calls need to occur. Note that the time out register (D3) will contain zero on the first call and −1 on all possible subsequent calls. Register D0 should be returned with an appropriate error code.

Channel Close

The channel close routine is relatively simple and needs only to ensure that everything is tidied before releasing the space occupied by the channel definition block — by using the utility MM.RECHP. On entry to the routine register A0 will hold the base address of the channel definition block and registers A3, A6 and A7 will hold their normal values for device driver accesses.

On exit, register D0 should be sent to an appropriate error code. This will normally be zero, because most operations will be assumed not to be able to fail. If the close operation cannot be completed because some I/O operation is still going on in the scheduler loop system, the channel definition block may be left alone and released at some later time during a scheduler loop call to the driver. In the latter case it will be the programmer's responsibility to close the channel once the I/O operation is complete. The IOSS will not remind you.

Essentially, the physical

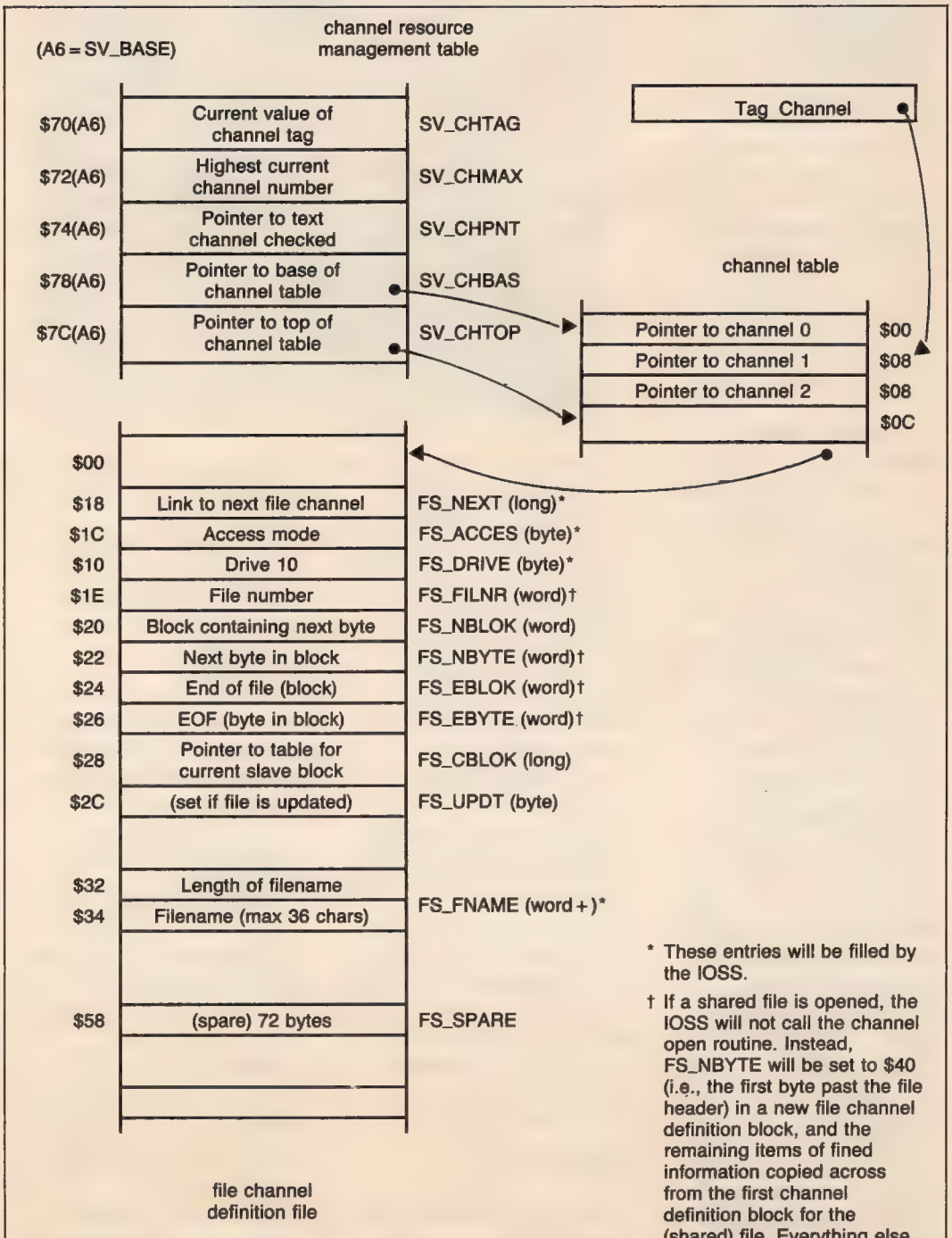
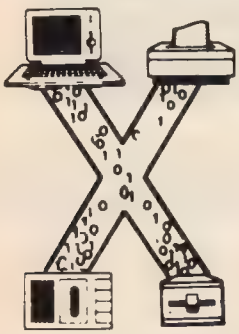


Figure 1. File system channel definition block.

layer code of a device driver is used to manipulate I/O control operations asynchronously with a job requiring that I/O. Data may be buffered — e.g., queued and de-queued — external interrupts



serviced, and so on. There are three types of physical layer access and we now look at each in detail to see how we might write our physical layer code. All physical layer calls are in supervisor mode and they may disable interrupts.

External interrupts

An external interrupt service routine must check its related hardware to see if the interrupt was intended for itself. If not, the service routine can terminate with a return (RTS). If the interrupt is found to relate to the service routine, the routine should perform the required operations, clear the interrupt source, and then return — RTS, not RTE. Memory may not be allocated or released to Qdos by an interrupt service routine.

50Hz/60Hz interrupts

This interrupt should be used only for critical timing operations which take a minimal time to execute. Memory may not be allocated or released to Qdos by a 50/60Hz interrupt service routine.

Scheduler loop

The scheduler loop calls are used to complete I/O access layer operations. They do not interrupt atomic operations and memory can, therefore, safely be allocated or released.

Any errors which may occur in the physical layer normally are dealt with by setting an appropriate flag in the channel definition block workspace area — somewhere after offset $18. The access layer calls would then be written to check this error flag and react sensibly.

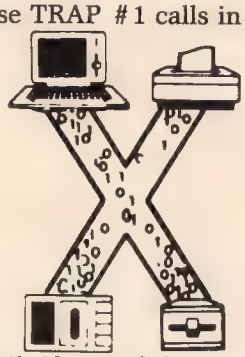
Alternatively, the utilities UT.ERR (vector $CC) or UT.MTEXT (vector $D0) may be called with A0 set to zero. An attempt will be made to write a message to channel 0 or, failing that, to channel 1. If both channels 0 and 1 are awaiting input, the message will be prevented from appearing. Other circumstances within Qdos may also prevent the message being displayed.

That concludes the discussion of non-directory device drivers. We now finish this part of the series by looking initially at directory device drivers. Three definition blocks are required for directory device drivers.

First, there is the directory device driver definition block. It must be set up at the initialisation stage of the device driver. Second, there is the channel definition block. There will be one channel definition block for every channel opened. Third, there is the physical definition block. There will be one physical definition block for each drive. Both the channel definition block and the physical definition block will be allocated by the IOSS.

Embodied in the directory device driver definition block are the interrupt and service loop physical layer links, the I/O access layer links, and general workspace. The physical layer interrupt and service links will be set, if required for the driver, by setting-up the addresses for the driver service routines in question — at offsets $04, $0C, and $14 — and then using the TRAP #1 calls MT.LXINT (D0=$1A), MT.LPOLL (D0=$1C), and MT.LSCHD (D0=$1E) to link the service routines into Qdos.

Later we will cover those TRAP #1 calls in



detail. If any of the service routines are not to be made available to the driver we can leave the service addresses as zero and fail to link them into Qdos.

The access layer links are set up by setting the addresses for the access layer I/O operations — at offsets $1C, $20, $24, $28, $34, $38 and $3C) — and then using the TRAP #1 call MT.LDD (D0=$22) to link the directory device driver definition block into Qdos. The directory device driver definition block is, therefore, an extended form of the standard device driver definition block, and it has the following format:

Offset (A3)	Use
	Physical layer links
$00	Link to next external interrupt routine
$04	Address of external interrupt routine
$08	Link to next 50/60Hz interrupt routine
$0C	Address of 50/60Hz interrupt routine
$10	Link to next scheduler loop routine
$14	Address of scheduler loop routine
	Access layer links
$18	Link to access layer of next device driver
$1C	Address of data I/O routine
$20	Address of channel open routine
$24	Address of channel close routine
$28	Address of entry for forced slaving
$2C	Reserved
$30	Reserved
$34	Address of format routine
$38	Length of physical definition block
$3C	Length of drive name (word)
$3E	<drive name, padded by zero if necessary, in upper case>
	Physical driver working space
$xx	<as required>

In all other respects the directory driver definition block is similar to the standard device driver version.

The channel definition block for a directory device driver is well specified, as shown in figure one, and is set up by the IOSS. The size of the entire block is 160 ($A0) bytes.

Note that there are still 24 ($18) bytes of reserved space at the top of the channel definition block and that there are 72 ($48) bytes of space workspace available for your use, if required, at the bottom of the block.

The items marked with an asterisk will be initialised by the IOSS after the block has been allocated space by the IOSS. All remaining bytes in the channel definition block will be zero.

More will be said of this definition block, and the physical definition block at which we will look next, in the discussion on the directory driver access layer channel open routine next month.

THE P+R:O=G<S

If you have a program that is worthy of consideration, send it to 'The Progs', Sinclair QL World, 79–80 Petty France, London SW1H 9ED. We pay for everything published at the usual page rates — £80 per thousand words.

3D DESIGNER — J F TYDEMAN CONTINUED

This is the second part of 3D Designer continued from the March issue. The program allows you to produce screen pictures incorporating 3D elements.

The commands, which we described in the last issue can be accessed by single key entry. The program also features a number of 3D graphics routines which are described below.

Block routine — key B.

This routine produces a cube which can be manipulated by width, height, depth, colour; and may be inclined at any angle. The graphic may then be moved, confirmed, or painted.

Triangle routine — key T.

All the commands and facilities available in the Block routine are available in Triangle. Also, Turn inverts the triangle.

Curve routine — key C.

This has the same facilities as the previous two routines. Turn changes the curvature of the arc.

Ribbon routine — key R.

The Ribbon routine simulates a 3D effect by drawing a series of arcs, perspective is not parallax corrected. To start a new line, using the curor keys, move the end of the arc to the position required for the beginning of the new line. Press E for the End command and the new arc will continue from the end of the previous one. The angle of the arc can be adjusted as required.

With 3D Designer you should have few problems creating interesting screen. If you are stuck of ideas take a look at our screen design competition winners in the September '86 issue. Finally, if you want a hard copy of your efforts, the menu enables use of the Psion printer dump incorporate with Easel.

CONTINUED FROM MARCH '87 ISSUE

```
236 IF comma=3:AT£0,0,0:PRINT£0;"    (P)AINT : (E)RASE : LOC= ";INT(co);"/";INT(r
o);" ":AT£0,1,0:PRINT£0;"   FILES(F1) :  ARC1(Z/X) :  ARC2(J/K)"
237 END DEFine panel20
238 DEFine PROCedure darc
239 CLS£0
240 REPeat cu
241 inpu2:INK£0,7:PAPER£0,2
242 panel20
243 IF void=0:GO TO 245
244 OVER pain:cub4
245 b$=INKEY$(-1)
246 avoid
247 IF void=0:GO TO 249
248 OVER pain:cub1
249 IF b$="c":color:OVER 1:cub4:OVER 1
250 IF b$="q":OVER 0:CLS£0:RETurn
251 END REPeat cu
252 FILL 0:conv2
253 END DEFine darc
254 DEFine PROCedure cub4
255 FILL 0:color
256 IF solid=3
257  INK scol:ARC co+w,ro TO co+w,ro+z,de:LINE co+w+incl,ro+z TO co1+w1,ro1+z1:
ARC co1+w1,ro1+z1 TO co1+w1,ro1,-dev:LINE co1+w1,ro1 TO co+w,ro:FILL 0:color
258 INK scol:ARC co,ro TO co,ro+z,dev1:LINE co,ro+z TO co1,ro1+z1:ARC co1,ro1+z1
 TO co1,ro1,-dev1:LINE co1,ro1 TO co,ro:FILL 0:color
259 INK tcol:LINE co,ro TO co1,ro1 TO co1+w1,ro1 TO co+w,ro TO co,ro:FILL 0:colo
r
260 END IF
261 INK fcol:ARC co,ro TO co,ro+z,dev1:LINE co,ro+z TO co+w,ro+z:ARC co+w,ro+z T
O co+w,ro,-dev:LINE co+w,ro TO co,ro:FILL 0:color
262 END DEFine cub4
263 DEFine PROCedure chocol
264 inch=inc:inc=1:PAPER£0,0:CLS£0
265 REPeat choic
266 PAPER£2,in:IF in>=0 AND in<=255:CLS£0:AT£0,0,14:PRINT£0;"    Select Colour
(?>)"
```

```
267 IF in>=0 AND in<=255:AT£0,1,14:PRINT£0;"   Step(0-9)  (C)onfirm"
268 AT£0,2,14:PRINT £0;"    <: VALUE:  ";in;"   ":CLS£2
269 cho$=INKEY$(-1)
270 IF CODE(cho$)=216:in=in-inc
271 IF CODE(cho$)=208:in=in+inc
272 IF in<0:in=255
273 IF in>255:in=0
274 IF cho$="c":EXIT choic
275 b$=cho$:incre
276 END REPeat choic
277 INK£1,in:inc=inch:PAPER£0,2:INK£0,7:CLS£0:PAPER£2,2:CLS£2
278 END DEFine chocol
279 DEFine PROCedure chodep
280 value=low
281 REPeat choic
282 IF value<=high AND value>=low:CLS£0:AT £0,0,0:PRINT£0;"  Select Value (>?) S
tep(0-9)  (C)onfirm "
283 AT£0,1,0:PRINT£0;"  CURRENT VALUE: ";value;"   ":cho$=INKEY$(-1)
284 IF CODE(cho$)=216:value=value-inc
285 IF CODE(cho$)=208:value=value+inc
286 IF value>high:value=low
287 IF value<low:value=high
288 IF cho$="c":EXIT choic
289 b$=cho$:incre
290 END REPeat choic
291 PAPER£0,2:INK£0,0:CLS£0
292 END DEFine chodep
293 DEFine PROCedure deviate
294  paus:hol$=hor$:pe$=per$:persp:bep
295  IF pe$<> per$ OR hol$<> hor$ THEN IF per$="l" AND hor$="u" OR per$="r" AND
hor$="d":dev2=dev:dev=dev1:dev1=dev2:END IF
296 IF pe$<> per$ OR hol$<> hor$ THEN IF per$="r" AND hor$="u" OR per$="l" AND h
or$="d":dev2=dev:dev=dev1:dev1=dev2:END IF
297  IF pe$<>per$ AND hol$<>hor$ THEN IF per$="l" AND hor$="u" OR per$="r" AND h
or$="d":dev2=dev:dev=dev1:dev1=dev2:END IF
298 IF pe$<>per$ AND hol$<>hor$ THEN IF per$="r" AND hor$="u" OR per$="l" AND ho
r$="d":dev2=dev:dev=dev1:dev1=dev2:END IF
299 END DEFine deviate
300 DEFine PROCedure Files
301 CLS£0
302 REPeat option
303 AT£0,1,0:PRINT£0;"  (M)ind    (G)et   (S)ave    (L)oad              (V)iew
 (C)ls   (Q)uit"
304 : a$=INKEY$(-1)
305 IF a$="m" :PAPER£0,0:CLS£0:DELETE mdv1_mind:SBYTES mdv1_mind,131072,32768:PA
PER£0,2:CLS£0:RETurn
306 IF a$="g":LBYTES mdv1_mind,131072:CLS£0:RETurn
307 IF a$="s":trap:PAPER£0,2:CLS£0
308 IF a$="l":trap1
309 IF a$="v":PAPER£0,0:CLS£0:PAUSE:PAPER£0,2:CLS£0
310 IF a$="c"
311 CLS£0
312 PRINT£0;"    SELECT MODE (4/8) ":high=8:low=4:inc=4:PAUSE 50:chodep:mo=value
313 IF mo=4 OR mo=8:MODE mo:ELSE :GO TO 311:END IF
314 CSIZE£0,2,0:CLS£0:INK£0,7:PRINT£0;"    Paper colour?":PAUSE 50:hold=in:choco
l:PAPER in:in=hold:INK in:CLS£1:CLS£0
315 END IF
316 IF a$="q":RETurn :END IF
317 :INK£0,7:PAPER£0,2:CLS£0
318 END REPeat option
319 END DEFine Files
320 DEFine PROCedure blank
321 CLS£0:hold=in:PRINT£0;"Colour of Panel?":PAUSE 50:chocol:in=hold:CLS£0
322 END DEFine blank
323 DEFine PROCedure trap
324 CLS£0
325 INPUT£0;"    Name?. WITH DEVICE NAME e.g.mdv2_          (Q)uit  ";name$
326 IF name$="q":RETurn
327 PAPER£0,0:CLS£0
328 SBYTES name$,131072,32768:RETurn
329 GO TO 324
330 END DEFine trap
331 DEFine PROCedure trap1
332 CLS£0
334 CLS£0:PAPER£1,0:CLS£1:DIR mdv2_
```

THE PROGS CONT.

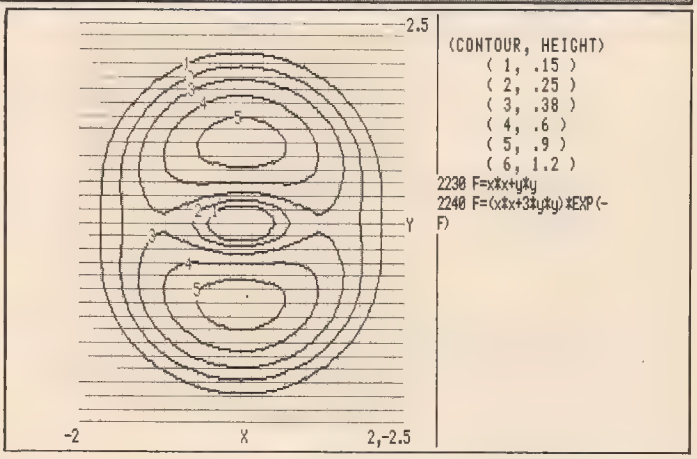
```
335 INPUT £0;"    Name?  WITH DEVICE NAME e.g.mdv2_          (Q)uit  ";name$
336 IF name$="q":RETurn
337 LBYTES  name$,131072:RETurn
338 ELSE
339 bep:PAUSE 100:RETurn
340 END IF
341 GO TO 333
342 END DEFine trap1
343 DEFine PROCedure ove
344 IF b$="x":ov=-1:bep
345 IF b$="z":ov=1:bep
346 END DEFine ove
347 DEFine PROCedure ribbon
348 conv3:FILL 0:fcol=2:scol=4:tcol=7
349 ang =1:inc=9
350 REPeat ar
351 panel2
352  OVER -1:ARC bco,bro TO eco,ero,ang
353 b$=INKEY$(-1):bep
354 OVER -1:ARC bco,bro TO eco,ero,ang
355 curse
356 eco=co:ero=ro
357 IF b$="q":reset:RETurn
358 IF b$="c":OVER 1:arcon:bco=eco:bro=ero
359 IF b$="w":low=1:high=50:inc=1:chodep:pix=value:INK£0,7
360 IF b$="i":col3
361 IF b$="=":ang=ang+.1
362 IF b$="-":ang=ang-.1
363 IF b$="t":ang=-ang:bep
364 inpu
365 begi
366 END REPeat ar
367 FILL 0:conv2:reset
368 END DEFine ribbon
369 DEFine PROCedure arcon
370 CLS£0:num=0
371 FOR nu=1 TO 2
372 num=num+1
373 FOR n=1 TO pix
374 IF num=1:bco=bco+1:bro=bro+1:eco=eco+1:ero=ero+1:INK scol
375 IF num=2:INK fcol:ARC bco,bro TO eco,ero,ang:bco=bco-1:bro=bro-1:eco=eco-1:e
ro=ero-1
376 ARC bco,bro TO eco,ero,ang
377 ARC bco,bro-1 TO eco,ero-1,ang
378 ARC bco,bro-1 TO eco-1,ero,ang
379 ARC bco-1,bro TO eco-1,ero,ang
380 ARC bco-1,bro TO eco,ero-1,ang
381 END FOR n
382 IF num=1:bco=bco-pix:bro=bro-pix:eco=eco-pix:ero=ero-pix
383 IF num=2:bco=bco+pix:bro=bro+pix:eco=eco+pix:ero=ero+pix
384 END FOR nu
385 END DEFine
386 DEFine PROCedure panel2
387 CLS£0
388 AT£0,1,1:PRINT£0;"   (E)nd       (C)onfirm       (I)nks        Angle(+/-) (W
)idth  (T)urn  (Q)uit"
389 END DEFine panel2
390 DEFine PROCedure avoid
391 IF (CODE(b$)>=0 AND CODE(b$)<=42) OR (CODE(b$)>=47 AND CODE(b$)<=59) OR b$="
p"
392 void=0:bep
393 ELSE void=1:bep
394 END IF
395 END DEFine
```

CONTOUR PLOTTER by J R Dormand

Contour plotter draws a specified number of contours in a rectangular region for a mathematical function of two variables or for an equally spaced array of heights input as data. The option of dumping the plot to a printer is provided via the Easel printer dump.

The program allows a user to specify the number of grid points in the horizontal (x) and vertical (y) directions. If the (I)nput option is then selected the appropriate number of heights must be typed in. When the (F)unction option is chosen the program will compute the necessary heights using the FuNction FU (line 2220). The program listing contains an interesting example function: it is a simple matter to change this. The height of each required contour and the ranges of x and y must be specified.

The time required for a plot is proportional to the number of grid points specified.




```
100 REMark CONTOUR PLOTTER BY J.R.DORMAND, version 1.0
110 MODE 4
120 OPEN#4,scr_:WINDOW 320,230,26,3:WINDOW#4,145,230,346,3:WINDOW#0,465,22,26,23
3
130 CLS:CSIZE 3,1:PRINT \'   Contour Plotter'\\'          by'\\'   Dr J.R.Dormand
'\\:CSIZE 0,0:PRINT TO 14;'Version 1.0'
140 CSIZE#0,2,0:CSIZE#4,1,0:PAPER#4,0:INK#4,7:CLS#4
150 INK#0,0:PAPER#0,5:CLS#0:PAPER 0
160 ORX=6:ORY=6
170 INPUT#0,'NO. of X VALUES ';NX;\;'NO. of Y VALUES ';NY
180 NSTOR=NX*NY
190 DIM POINTS(NY,NX),ISCAN(NX),IXSTOR(NSTOR),IYSTOR(NSTOR)
200 PRINT#0,'Input data (I) or Function (F)?':BEEP 2500,10:Qif$=INKEY$(-1):BEEP:
CLS#0
210 CSIZE 2,0
220 IF Qif$=='I' THEN
230  CLS
240  PRINT 'INPUT DATA IN ROWS'
250  FOR J=1 TO NY
260   PRINT '   Row ';J!!
270   FOR i= 1 TO NX
280    INPUT POINTS(J,i)!!
290   END FOR i:PRINT:END FOR J
300 END IF
310 INPUT#0, 'XRANGE LO TO HI',XLO!'to'!XHI\'YRANGE LO TO HI',YLO!'to'!YHI
320 HX=(XHI-XLO)/(NX-1):HY=(YHI-YLO)/(NY-1)
330 INPUT#0,'NO OF CONTOURS ';NCO:DIM ZLE(NCO)
340 FOR i=1 TO NCO:PRINT#0,'CONTOUR ';i,:INPUT#0,ZLE(i):END FOR i
350 IXBEG=0:IWBEG=0
360 IF Qif$=='f' THEN
370  PRINT '    COMPUTING HEIGHTS'
380 FOR i=1 TO NX
390  PRINT#0,'EVALUATING ROW'!i
400 FOR J=1 TO NY
410 POINTS(J,i)=FU((i-1)*HX+XLO,YHI-(J-1)*HY)
420 END FOR J:END FOR i
430 END IF
440 AT#4,2,0:PRINT#4,' (CONTOUR, HEIGHT)'
450 PRINT#0,'LOAD PRINTER DUMP(y/n)?':BEEP 2500,10:QP$=INKEY$(-1):BEEP:CLS#0
460 IF QP$=='Y' THEN
470  ADDR=RESPR(2000):LBYTES MDV1_GPRINT_PRT,ADDR
480 END IF
490 XSIZE=100-2*ORX:YSIZE=100-2*ORY
500 LINE#4,0,0 TO 0,100
510 CLS:CSIZE 0,0
520 CURSOR ORX,ORY,-12,2:PRINT XLO
530 CURSOR ORX+XSIZE,ORY,-30,2:PRINT XHI;',';YLO
540 CURSOR ORX+XSIZE,ORY+YSIZE,2,-5:PRINT YHI
550 CURSOR ORX+.5*XSIZE,ORY,0,2:PRINT 'X'
560 CURSOR ORX+XSIZE,ORY+.5*YSIZE,2,-5:PRINT 'Y'
570 INK 3
580 SCALEX=XSIZE/(NX-1):SCALEY=YSIZE/(NY-1)
590 LINE ORX,ORY :LINE_R TO XSIZE,0 TO 0,YSIZE TO -XSIZE,0 TO 0,-YSIZE
600 INPUT#0,'DRAW GRID(y/n)? ':BEEP 2500,12:Q$=INKEY$(-1):BEEP:CLS#0
610 IF Q$=='Y' THEN
620 FOR i=1 TO NX-2:x=i*SCALEX+ORX:LINE x,ORY TO x,YSIZE+ORY:END FOR i
630 FOR J=1 TO NY-2:y=J*SCALEY+ORY:LINE ORX,y TO XSIZE+ORX,y:END FOR J
640 END IF
650 INK 7
660 FOR CURVE=1 TO NCO
670 ZLEV=ZLE(CURVE)
680 AT#4,CURVE+2,4:PRINT#4,' ( ';CURVE;', ';ZLEV;' )'
```

```
690 KSTOR=0:KSCAN=0
700 FOR KROW=1 TO NY
710 FOR KCOL=2 TO NX
720 x=POINTS(KROW,KCOL-1):y=POINTS(KROW,KCOL)
730 IF x<ZLEV AND y>=ZLEV THEN
740  IXBEG=KCOL-1
750  IWBEG=KCOL
760 ELSE
770  IF y<ZLEV AND x>=ZLEV THEN
780   IXBEG=KCOL
790   IWBEG=KCOL-1
800  ELSE
810   GO TO 1510
820  END IF
830 END IF
840 IYBEG=KROW:IZBEG=KROW
850 FOR L=1 TO KSCAN
860 IF IXBEG=ISCAN(L) THEN GO TO 1510
870 END FOR L
880 FOR IBOUN=1 TO -1 STEP -2
890 IX=IXBEG:IY=IYBEG
900 IW=IWBEG:IZ=IZBEG:IFIRST=1:ISTEP=0
910 IXGO=IW-IX:IYGO=IZ-IY
920 CALC IX,IY,IXGO,IYGO,DIST
930 DX=DIST*IXGO:DY=DIST*IYGO
940 XNEW = (IX-1+DX)*SCALEX+ORX
950 YNEW=YSIZE-(IY-1+DY)*SCALEY+ORY
960 IF ISTEP<>0 THEN
970  IF IXGO*IYGO=0 THEN
980   IXG=IXGO:IYG=IYGO
990   ROTAT IXG,IYG,IBOUN,45
1000   IA=IW-IXG:IB=IZ-IYG
1010   CALC IA,IB,IXG,IYG,DIST
1020   LINE TO XLAS,YLAS
1030   DX=DIST*IXG:DY=DIST*IYG
1040   XLAS=(IA-1+DX)*SCALEX+ORX
1050   YLAS=YSIZE-(IB-1+DY)*SCALEY+ORY
1060  ELSE
1070   IF DIST>.5 THEN
1080    XT=XLAS:XLAS=XNEW
1090    XNEW=XT:XT=YLAS
1100    YLAS=YNEW:YNEW=XT
1110   END IF
1120  END IF
1130 END IF
1140 IF IFIRST <> 1 THEN
1150  LINE TO XLAS,YLAS
1160 ELSE
1170  LINE  XNEW,YNEW
1180 END IF
1190 XLAS=XNEW:YLAS=YNEW
1200 IF IFIRST<>1 AND IX=IXBEG AND IY=IYBEG AND
     IW=IWBEG AND IZ=IZBEG THEN
1210  LINE TO XLAS,YLAS
1220  INK 5:CURSOR XLAS,YLAS,-5,-5:PRINT CURVE:INK 7
1230  GO TO 1510
1240 END IF
1250 IFIRST=0:ISTEP=0
1260 ROTAT IXGO,IYGO,IBOUN,45
1270 IW=IX+IXGO:IZ=IY+IYGO
1280 IF IW<1 OR IW>NX OR IZ<1 OR IZ>NY
     THEN GO TO 1490
1290 IF POINTS(IZ,IW)<ZLEV THEN
1300  ISTEP=1:IX=IW:IY=IZ
1310  ROTAT IXGO,IYGO,IBOUN,135
1320  IW=IX+IXGO:IZ=IY+IYGO
1330  IF IY=KROW THEN
1340   KSCAN=KSCAN+1
1350   ISCAN(KSCAN)=IX
1360  ELSE
1370   IF IY>KROW THEN
1380    KSTOR=KSTOR+1
1390   IF KSTOR>NSTOR THEN
1400    PRINT#0,'WORKSPACE EXCEEDED'
1410    GO TO 1510
1420   END IF
1430  IXSTOR(KSTOR)=IX
1440  IYSTOR(KSTOR)=IY
1450  END IF
1460  END IF
1470 END IF
1480 GO TO 920
1490 LINE TO XNEW,YNEW:INK 5:CURSOR XNEW,YNEW,
     -5,-5:PRINT CURVE:INK 7
1500 END FOR IBOUN
1510 REMark
1520 END FOR KCOL
1530 IF KROW<NY THEN
1540  JSTOR=0:KSCAN=0:NEX=KROW+1
1550  FOR L=1 TO KSTOR
1560  IXT=IXSTOR(L):IYT=IYSTOR(L)
1570  IF IYT=NEX THEN
1580   KSCAN=KSCAN+1
1590   ISCAN(KSCAN)=IXT
1600  ELSE
1610   IF IYT>NEX THEN
1620    JSTOR=JSTOR+1
1630    IXSTOR(JSTOR)=IXT
1640    IYSTOR(JSTOR)=IYT
1650   END IF
1660  END IF
1670 END FOR L
1680 KSTOR=JSTOR
1690 END IF
1700 END FOR KROW
1710 END FOR CURVE
1720 CSIZE#4,0,0
1730 IF Qif$=='f' THEN LIST#4,2230 TO 2249:
     ELSE : PRINT#4, TO 2;'Input data'
1740 IF QP$=='Y' THEN
1750  PRINT#0,'PRINT CONTOURS(y/n)?':BEEP 2500,
      15:Q$=INKEY$(-1):BEEP
1760  IF Q$=='Y' THEN
1770   PAPER#0,0:CLS#0
1780   CALL ADDR
1790   PAPER#0,5:CLS#0
1800 END IF
1810 END IF
1820 STOP
1830 DEFine PROCedure CALC(IXX,IYY,IXF,IYF,DIST)
1840 LOCal IA,IB
1850  IA=IXX+IXF:IB=IYY+IYF
1860  IF IXF=0 OR IYF=0 THEN
1870   DTOP=ZLEV-POINTS(IYY,IXX)
1880   DBOT=POINTS(IB,IA)-POINTS(IYY,IXX)
1890   DIST=DTOP/DBOT
1900  ELSE
1910   PMID=POINTS(IYY,IXX)+POINTS(IB,IA)
1920   QMID=POINTS(IB,IXX)+POINTS(IYY,IA)
1930   ZMID=(PMID+QMID)/4
1940   IF ZMID>=ZLEV THEN
1950    DTOP=ZLEV-POINTS(IYY,IXX)
1960    DBOT=ZMID-POINTS(IYY,IXX)
1970    DIST=.5*DTOP/DBOT
1980   ELSE
1990    DTOP=ZLEV-ZMID
2000    DBOT=POINTS(IB,IA)-ZMID
2010    DIST=.5+.5*DTOP/DBOT
2020   END IF
2030  END IF
2040 END DEFine CALC
2050 DEFine PROCedure ROTAT(IXX,IYY,ISENS,ANG)
2060  IF ANG=135 THEN
2070   IXX=-IXX
2080   IYY=-IYY
2090  END IF
2100  IX1=IXX-ISENS*IYY
2110  IY1=IXX*ISENS+IYY
2120  IXX=IX1/MAX(1,ABS(IX1))
2130  IYY=IY1/MAX(1,ABS(IY1))
2140 END DEFine ROTAT
2150 DEFine FuNction MAX(R,S)
2160  IF R>S THEN
2170   RETurn R
2180  ELSE
2190   RETurn S
2200  END IF
2210 END DEFine MAX
2220 DEFine FuNction FU(x,y)
2230 F=x*x+y*y
2240 F=(x*x+3*y*y)*EXP(-F)
2250 RETurn F
2260 END DEFine FU
```

MICRODRIVE EXCHANGE

READY TO RUN SOFTWARE

THE PROGRAMS

Author	Language	Program Name	Price	Issue	Size
1. Giles Todd	(B)	DIY Assembler	£5	Mar/Jun	120
Converts Assembler source into m/c object code					
2. Richard Cross	(AO)	Mini Monitor	£3	Oct	60
Pocket-sized monitor with comprehensive facilities					
3. A Didcock	(B)	Connect4	£1	Sept	15
Pit your wits against the QL					
4. Shergold & Tose	(B)	*Golf	£2	May	35
From fairway to green on 50 courses of varying difficulty					
5. Williams & Holliday	(AO)	Paladin	£5	Apr	70
The basis of our games programming series — a Space Invaders-type game written entirely in machine code					
6. Richard Cross	(MB)	Sprite Animation	£2	Apr	50
A subtle blend of machine code and SuperBasic which produces a versatile sprite designer and high-speed animator					
7. Steve Deary	(B)	Pacman	£1	Mar	20
A reasonably fast rendition of the famous arcade favourite					
8. Andy Carmichael	(B)	Family Tree	£3	Aug	100
Archive program and database for setting-up and displaying large family trees					
9. James Lucy	(L)	Composer	£3	Oct	50
Composer and play sheet music on the QL					
10. Mathew Capp	(B)	Miners	£2	Aug	30
A nail-biting management simulation which puts you in charge of the NCB					
11. P J Smith	(B)	*DIY Adventure	£1	Feb	60
A skeleton framework where you have to slot in the details to create your bespoke adventure					
12. R Green	(B)	Othello	£1	Aug	25
A 3D version of the well-known board game Othello for one or two players					
13. S J Ackers	(S)	*Touch Type	£4	Aug	80
Touch-typing course — 14 lessons, on-screen keyboard, 800+ word vocabulary and WPM readout					
14. Rob Sherratt	(AO)	FCOPY	£4	Mar'86	80
A machine code Microdrive utility for turbocharged file copying					
15. Alan Prior	(B)	World Map	£2	Mar'86	80
A high-resolution multi-coloured map of the world for geography buffs					
16. J M Dower	(B)	Mushyman	£2	Jun/Jul'86	15
Mushroom munching arcade action					
17. Tony Quinn	(S)	*CAD QL	£4	Sept'86	180
Professional features include rubber banding and user-definable symbol library					
18. Stuart Campbell	(MB)	Attack of the Things	£3	Oct'86	45
Can you repulse the attacking Things?					
19. Karl Jeffery	(MB)	Starport 2001	£3	Nov'86	40
An authentic version of the arcade game Galaxians					
20. Marcus Jeffery	(S)	QL Go	£4	Apr/May'86	40
A must for strategy games enthusiasts					
21. J P Hartrey	(B)	Britain	£2	Nov'86	20
Improve your geography knowledge with this round Britain quiz					
22. KBG Judson	(B)	Darts	£2	Dec'86	30
The popular pub pastime in pixels					
23. Neil Taylor	(S)	Window Designer	£2	Feb'87	40
On-screen window designer					
24. J. F. Tydeman	(S)	Design 3D	£4	Mar'87	200
An extensive utility for the production of 3D Screen designs					

Program of the month

Design 3D is one of the biggest programs ever featured in Microdrive Exchange. In addition to the Basic program listed in The Progs, it includes a 2D drawing program and a suite of graphics and filing utilities.

The programs have been linked and compiled using Supercharge and, in total, are more than 60K long. Some of the facilities of the 3D program are explained in The Progs pages. The 2D graphics function includes facilities for drawing arcs, rectangles, triangles and circles, together with commands for their manipulation, such as Rotate.

The utilities are contained in a separate program which can be accessed from the main menu. Facilities include dimensioned text input, re-colour and files. Two extremely useful functions are Pan, which enables you to define a screen block and a move it around; and Mind, with which you can store a part of the screen temporarily on which you are working, in case you make a mess of it.

3D Design is supplied complete with instructions in a Quill document file on the Microdrive.

There is a slight change to the order form this month. Please indicate the numbers (1–24) of the programs you require in the boxes provided.

BACK ISSUE ORDER FORM

Name .....

Address .....

.....

.....

Issue(s) required .....

Total cost £.....

When ordering back issues, it is best to ensure that the copy you require is available by telephoning Anna Morrison on 01-222 9090. Please enclose a cheque/PO payable to *Sinclair QL World*. Rates for back issues are £2 per copy for the U.K., £3 for overseas.

O R D E R F O R M

B=SUPERBASIC AO=ASSEMBLER+OBJECT CODE (READY TO RUN) MB=MACHINE CODE+BASIC LOADER S=SUPERCHARGED L=QLiberated

No. of programs required		Total cost of programs	£
No. of drives required		Drive cost @ £2.50	£
Total sectors (max. 200 per drive)		Sub total	£
No. of drives sent		+15% VAT	£
Program 'ID' numbers		Postage and packing	£0.75
		Total to be sent	£

Name Address

Please copy on to Microdrive the programs above which I have indicated with a cross. I enclose a cheque/PO to the value of £..... made payable to *Sinclair QL World*. I understand that *Sinclair QL World* undertakes to supply only these programs (copied on to Microdrive) and accepts no liability for their operation as defined by the author. Neither can *Sinclair QL World* supply additional information about any of the listings other than that originally printed. Any article reprints required must be ordered and paid for separately at £2 each inclusive of post and packing (£3 overseas).

INSTANT ACCESS

TR Computer Systems
093 924 621
Utilities

WD Software
0534 81392
Utilities

ZitaSoft
Steve Jones, 93 Foxbourne Road, London SW17 8EN
Utilities

SERVICES

Computer Repair Centre
0379 52588

Data Printing Services
25 Seymour Road, Bath, BA1 6DY

Owl Computer Training
044 282 7302

Quanta
0908 564271

Rainbow Repairs
0904 768853

Zedem Computers Ltd
0234 213032

QL SUPERBASIC TRACE

Single step, break points, trace escape, untrace.
£5.00 inc. VAT and p&p (on mdv).

David Henderson, Parsonage Farm, Great Wolford, Shipston-on-Stour, Warks CV36 5NQ.

SECOND HAND

SPECTRUM 48K FOR SALE
£49.95 o.n.o.
For further details:
Phone: 01-440 2194

QL REPAIRS

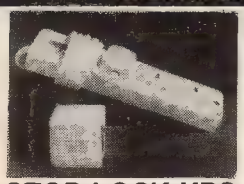
ANY FAULT **£27.95** INCLUSIVE OF P&P, VAT INSURANCE AND 3 MONTHS GUARANTEE. FOR REPAIRS ON OTHER MICROS PHONE FOR DETAILS.

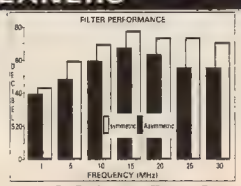
SUREDATA

Telephone: 01-902 5218

UNIT 6, STANLEY HOUSE
STANLEY AVENUE, WEMBLEY
MIDDX. HA0 4JBQ

COMPUTER CLEANERS





STOP LOCK-UPS AND DATA CORRUPTION

If this is due to mains interference then our plugs may be the answer
As well as cutting high voltage spikes they smooth the cut spikes and filter RF interference from 1 to 30 MHz (better than 40db) and up to 130 MHz.

Some customer comments:
"With the cleaner . . . (locking up) . . .is no problem now"—*Electrical engineer.*
" . . . these computer cleaners work"—*Commodore user group.*
"Many thanks for your help, efficiency and, above all, for producing such an effective device"—*N Daglish, New Zealand*

ADAPTOR—1 three pin socket ..... **£14** inclusive
ADAPTOR—2 three pin sockets ..... **£18** inclusive
TRAILING 4-WAY SOCKET ..... **£24** inclusive

Simply plug in—no wiring required.

TONY FIRSHMAN SERVICES
12 Bouverie Place, London W2 1RB. 01-724 9053

QL POOLSWINNER VERSION 2.0

THE ULTIMATE POOLS PREDICTION PROGRAM

★ **IMPROVED MASSIVE DATABASE** Poolswinner as a sophisticated pools prediction aid and took over 4000 hours to compile. It comes complete with large database with over 35,000 matches since 1968. All English and Scottish team names are included.

★ **FORECASTS** score draws and no score draws with built in perm generator and faster than version 1.0—mark your coupon direct from screen.

★ **SUCCESSFUL** We guarantee that POOLSWINNER performs considerably better than chance. If you can prove otherwise we shall refund.

UNIQUE The prediction Formulae calculates the efficiency of every team with present and past results—but no tedious typing. We have yet to see a predictor that uses this method.

ONLY £14.99 on microdrive cartridge
SAME DAY DESPATCH FROM:
XENON, 24 WHARNCLIFFE STREET, BARNSLEY, SOUTH YORKSHIRE S70 5BP

QL SMALL TRADERS PACK

★ SALES & PURCHASE LEDGERS ★ STOCK CONTROL ★ MAILING LIST ★ LABEL PRINTER ★ MINI-CALC ★ BILLBOARD DISPLAY SYSTEM ★ UNIT CONVERTER ★ FONE FILE ★ MDV UTILITY ★ AUTO-CLONE
★ Fully menu-driven and Epson compatible ★
All on one convenient, BIG-VALUE cartridge!
ONLY £19.95 (inclusive). Add £1 p/p (abroad).
Other QL software available)
Send cheques/PO's or SAE for full details:

SD MICROSYSTEMS (DEPT QL)
P.O. BOX 24, HITCHIN, HERTS, UK

QL KING

FOR ONE TO TEN PLAYERS
A DANGEROUSLY ADDICTIVE SIMULATION OF LIFE IN MEDIEVAL ENGLAND
Cheques and postal orders for £6.00 + £1.00 p&p.
To: H. C. Billington, Newnham College, Cambridge CB3 9DF.

SAMPSON SOFTWARE

STOP PLAYING GAMES

Use your computer to make money. Turn your hobby into a home-based income. Full and part time opportunities to cash in on this tremendous market. High earnings easily possible. Open to any amateur micro user and gamer. Write for free details.

Westlink Promotions (CV1)
108 George Street
Edinburgh EH2 4LH (37)

QL 4MATTER SUITE V6.0

Complete re-write of the best backup progs available, includes LOCKSMITHE a fast dedicated MDV copier with 99% success rate. 4MATTER now MDV to FLP transfers with at least 50% success rate for stand alone running copies. See out of date review in Nov 86 World for a taste of earlier ver$. Due to size, now on 2 MDV's with Locksmithe available alone for MDV only users. Existing users see help* & add £1.50 for 2nd MDV 4MATTER + LOCKSMITHE...£18.00; LOCKSMITHE (MDV only)...£10.00. MULTISPOOL a tasking spooler for use with Quill, (expanded m/c's only)...£10.00. Bulk and export orders available from Care Electronics, Watford. Prices, inc P+P, cheques, PO's to...Steve Jones,

ZITASOFT UK
93 FOXBOURNE ROAD,
LONDON SW17 8EN

"DISKS" AT LOW, LOW PRICES

SUPERSTAR
5¼" DSDD £8.50 PER 10
3½" DSDD £2.25 EACH

BASF
5¼" DSDD £11.50 PER 10

ADD £1.00 P & P.
ALL DISKS GUARANTEED.

GRYPHON SOFTWARE SYSTEMS LTD
P.O. Box 255, Bridgend, Mid-Glamorgan
CF32 0YE, United Kingdom
(0656) 744679

curry computer

Your Complete Sinclair Stockist

Hardware, Software, Peripherals,
Printers, Books, Magazines, Accessories
P.O. Box 5607 • Glendale, AZ 85312-5607 U.S.A.
1-602-978-2902 • Telex (via WUI): 6501267701
DEALER INQUIRIES WELCOME

QL KEYDEFINE

Uses ALT as extra shift to re-define all the keys. Up to 2K of text or commands on each key, includes Quill spooler. A must for Quill or Archive or basic users. £9.95

Psientific Software, 37 Cottesmore Road, Hessle, N. Humberside. Tel: 0482-649187.

"NEW RIBBONS FOR OLD" from ALADDINK

ALADDINK WILL RE-INK YOUR OLD FABRIC RIBBONS AT GREAT SAVINGS AGAINST NEW PRICES!!

INTRODUCTORY OFFER

Send a dry fabric ribbon cassette (stating printer make and model) with £2 and we'll re-ink it and quote you for future re-inkings.

ALADDINK (Dept QL), 4 Hurker Crescent, Eyemouth, Berwickshire TD14 5AP. Or 'phone for a quotation: **08907 50985**

EDUCATION

QL REVISOR

Teachers—create multiple choice test/exams, single question/answer, pages of text followed by comprehension questions or language vocabulary tests for your pupils using your own material. Add explanations if required. Allows a group of pupils to be left with the QL and collection of results at end of test. Copy tests to printer.

Students—create your own revision self-test files. Add to them week by week until you have all the pre-exam material you require. Test yourself on the whole file or selected pages.

Pages can be replayed sequentially or at random. Auto-marking of multiple choice questions with output to printer if required. Quick and easy insertion and editing of text with fast full-screen editor. Comprehensive text and page manipulation commands. Full control over screen display (windows size, posn, colour, text size).

Files can be loaded, saved, merged with existing files, printed to any valid QL device or exported to Quill. Single key commands and immediate on-screen instructions at every stage. Suitable for any QL. 100% multitasking machine code. Supplied on microdrive cartridge but easily copied to disk using the 'clone' program included.

Too many features to adequately describe here so phone or send your address for full details.

Ron Massey, Technical Reviewer for *QL World*, expressed "...a feeling of impressed astonishment.....By sheer weight of versatility there are very few fields of endeavour where a correct response from the user is required in which **Revisor** will not find a viable use, whether for teachers preparing examination papers or for students using their own material or that supplied by their mentors". *QL World*, February 1987, page 15.

Please send payment of £14.50 (sterling) by cheque drawn on a U.K. bank, Eurocheque, or postal order for immediate despatch. Price includes U.K. postage or worldwide overseas airmail.

DIGITRIX
Tel: 0326 40529
Wishingtons, Porkellis, HELSTON, Cornwall TR13 0LB

QUANTA

The Independant QL users group

★ monthly newsletter (36/40 pages)
★ free advice ★ tutors (Archive etc.)
★ massive software library (mostly free)
★ supports for local groups ★ workshops
★ printer hotline

Further details from Brian Pain, 24 Oxford St, Stony Stratford, Milton Keynes, MK11 1JU Tel: (0908) 564271

WORLD GAMES Issue One. Four Great Games on Microdrive: Reversi, Anagramatica, RowFour, Blackjack. Only £6.50 from: QL BudgetSoft, 25 Low Friar Street, Newcastle Upon Tyne, NE1 5UE.

DO NOT READ THIS

Once used microdrive cartridges

5 off	£5.00	10 off	£9.00
20 off	£16.00	50 off	£37.00
100 off	£70.00		

Microdrive cartridge wallets
65p each

QParts, 74 Dutton Way, Iver, Bucks, SL0 9NZ.

Instant Access

HARDWARE

ABC Electronic
010 49 521 8980881
Mouse/Software

Astracom
0792 473697
Modem

Care Electronics
0923 672102
Software and hardware specialist. Sandy official distributor. Q Jump official distributor. Wide range of leads available.

Chromagraphica
Colour monitor, high resolution, low cost. Full details from Chromographica, 135 Cliff Road, Hornsea, North Humberside HU18 1JB or telephone 04012 4699.

Computer Supplies
146 Church Road, Boston, Lincs.
Joysticks

Compware
0270 582301
Disc Drives, Memory, Monitors/Software

CST
24 Green Street, Stevenage, Herts SG1 3DS. Tel: (0438) 352150
Supplies of QL storage devices including QDisc. Interface and Ram drives 3.5in./5.25in., Dual 720K 3.5in. floppy disc drives, Ram plus 512K expansion QDisk and dual floppy, 20 MB Winchester, Q488 1EEE GP1B interface, QEP-111 Eprom programmer. Also supplies of Thor 1F, 2F, WF. Telephone for details.

Cumana Ltd
0483 503121
Disc Drives/Interface

Data Distributors Ltd
0990 28921
Kaga, Sinclair Vision

Datalink
031 554 6040
Printer interfaces

D. J. W. Software
11 Pound Close, Bramley, Hampshire, RG26 5BL

Eidersoft
0708 851099
QL Mouse, Disc Drives/Software

Eprom Services
0532 667183

Tony Firshman Services
01-724 9053
Mains spike filter

4 Systems
01-844 1399
Hardware and software

Kempston Ltd
0234 856633
Disc/Centronics interface

Management Science Ltd
17 West Hill, London, SW18
QL Case/Software

Micro Peripherals Ltd
0256 473232
Disc Drives/interfaces

Microworld
0293 545630/0273 6711863
Printers and monitors

Mirace Systems
0272 603871
Expanderam 512K/Software

Opus Supplies Ltd
Redhill 65080

PCML Ltd
0372 67282/68631
QL & RAM cards/Software

Penman Products Ltd
0903 209081
Penman plotters

Sandy (U.K.) P.C.P.
0234 219814
QLT, Disc systems, SuperQboard, RAM boards

Silicon Express
0533 374917
Disc interface/drives, Centronics interface, RAM boards, Monitors, Printers

Slave Software
050 846 8866
Q Disc/Software

SMC Supplies
01-441 1282
Joystick adaptor, Centronics and Epson Serial

Strong Computer Systems
0267 231246
Printers and Monitors/Software

T.K. Computerware
0303 812052
Stockist

Tandata
06845 68421
Q-Connect, Q-Mod, Q-Call

Technology Research Ltd
0784 63547
Disc interface with RAM and Centronics port

Transform Ltd
089 283 4783
QL dust cover, Microdrive storage box, RS232 lead, disc drives, monitors and printers

Viglen Computer Supplies
01-8112 9902

SOFTWARE

Adder Publishing Ltd
0223 277050
Utilities

Ark Distribution
Corve Farm House, Chale Green, Ventnor PO38 2LA. Tel: 098-379 496
Specialists in Archive systems for QL/PC/OPD computers and File Conversion/Recovery/Transfer Services. Our systems include Archivist (£29.95) a powerful all purpose text manager, Card File (£14.95/£19.95). A specialist addressing system, Mail File (£14.95/£19.95). A general addressing system with notes, Librarian (£19.95/£24.95), for cataloguing items like books, articles, records and videos, and Mail Merge (multi tasking) for producing quantities of formated reports. Using an archive export file and a quil Lis file.

Breakthrough Software
0763 45482
Utilities

Bridgebrook Intek
45 Burleigh Avenue, Wallington, Surrey
Utilities

Business Software
01-863 1861
Utilities

Collins Soft
Freepost, 30, London W1E 7JZ
Utilities

Consumers Association
Subscription Dept, PO Box 44, Hertford, SG14 1SH
Utilities

C.P. Software
10 Alexandra Road, Harrogate
Games

D. A. Bandoo
81 Mount Pleasant, Wembley
Utilities

D. J. Walker
22 Kimptons Mead, Potters Bar, Herts EN6
Utilities

D. S. Enterprises
01-671 0209
For the best deal in town on drives interfaces extra memory, software, discs, books and while stocks last used-once Microdrive cartridges. Our own software includes Ram Disk (world's fastest), sign designer and multi Task.

Data Management
0904 760351
Utilities

Datalink Systems
097081 360
Utilities & Games

Digital Precision
01-527 5493
Utilities & Games

D.R.K. Products Ltd
Bar 1, Pipers Lane, Markyate, St Albans, Herts AL3 8QF
Micro Cartridge Rack

D. S. Enterprises
01-671 0209
Utilities

Eigen Software
45 Bancroft Road, Widnes, Cheshire WA8 0LR
Games

Equate
2 Ffordd Derwyn, Penyffordd, Chester CH4 0JT
Utilities and games

Gemini Marketing
0395 265165
Utilites and games

G. S. T. Computer Systems
0954 81991
Utilities

Hisoft
0582 696421
Utilities

Intek Software
01-500 8534
Utilities

J. & D. Software
3 Alfred Road, Lowtown, Warrington

Key Software
0703 695182
Games and utilities

McGraw-Hill
0628 23431
Utilities

MetaComCo
0272 428781
Utilities

Microprocessor Engineering Ltd
Hanley Road, Southwater, Horsham, Sussex
Games and utilities

MicroApl
01-622 0395
Games and utilities

Microdeal
QL Software available from Microdeal PO Box 68, St Austell, Cornwall PL25 4YB.
The King £7.50 multi-screen Kong arcade game. Aquanaut 471 £14 graphic adventure/over 100 screens. Lands of Havoc £10 2000 screen graphic adventure. Cuthbert in Space £7.50 arcade zap em up. Crazy Painter £5 zany paint the floor game. Hopper £5 original Frogger-style arcade game

N. Alexander
53 Allen Road, Wolverhampton, West Midlands
Utilities

New Horizons Software
Fourwinds, 30 Cwm Lane, Rogerstone, Gwent
Games

Owl Computer Training
044 282 7302
Utilities

Paddy Software
0726 832718
Utilities

Palantir Products
60 St Lukes Road, Bedminster, Bristol
Utilities

PCS
8 Oakgrove Way, Bridgewater, Somerset
PCS Utilities

Peakcrown Ltd
4 Beeby Road, Scraptoft, Leicestershire LE7 9SG
Games

Peak Electronics
32 Clifton Avenue, Hartlepool, Cleveland
Utilities

Plantir Products
60 St Luke St, Bedminster, Bristol
Utilities

Portfolio Software
PO Box 15, London SW11

Position Computing
0554 759624
Utilities

Prentice Hall
0442 58531
Utilities

Prospero Software
Pro Fortran-77 is a full Ansi Specification Fortran 77 compiler for the QL. Pro Pascal is a full ISO specification Pascal compiler for the QL. Both consist of a 200-page manual, ROM cartridge and three Microdrives, and run on unexpanded 128K QL. Price £99.95 including VAT from Prospero Software Ltd, 190 Castelnau, London SW13 9DH. *Enquiries and credit card orders to 01-741 8531.*

Psientific Software
0482 649187
Utilities

Psion
01-723 9408/0553
Games and utilities

Pyramide
01-349 2764
Games and utilities

QCode
0235 28359
Games and utilities

Qflash
Hamburg 6512742
Utilities

Qjump
0954 50800
Utilites

QSoft
01-559 7417
Utilities

Quest
04215 66488
Utilities

Realtime Software
0532 458948
Games

Rubicon Micros
0742 583665
Games and utilities

S. & B. Software
20 St Nicholas Street, Diss, Norfolk
Games

Sector Software
45 Cheetham Meadow, Moss Side, Leyland, Lancs PR5 3UB
Games and utilities

Shadow Games
1/2 The Cottages, Maidenhatch, Tidmarsh, Berks RG8 8HP
Games and utilities

Smiling Software
26 Dale Road, Marple, Stockport SK6 6HA
Games and utilities

Solent Systems
0983 865694
Utilities

Stevenson & Partners
0428 51500
Utilities

Super Plant Software
097 423 223
Utilities

Swansoft
164 Vicarage Road, Morriston, Swansea
Games

Talent Computer Systems
041 552 2128
Games and utilities

TDI Software Ltd
0272 742 796
Utilities

I wish to update my Instant Access entry.
Please contact me.

Name_____

Company _____

Telephone _____

Please return to Jane Brooks Wadham,
SQLW, 79–80 Petty France, London SW1H 9ED.
Or telephone on 01-222 9090 ext. 222.

FRONT PAGE

FOR THE QL BY GAP SOFTWARE

THE QL DESKTOP PUBLISHER

GAP SOFTWARE
17 ST.JOHN'S TCE
LONDON E7 8BX
01-552-5452

FRONT PAGE was compiled using QLIBERATOR

Version 1.03 - mix text and graphics - unexpanded and expanded QL - mdv, flp, fdk, ram - A4 printout - udgs - inverse text - all QL text sizes - cut and paste - load and save screens - alternate character set - double pass print option - udg design - Epson compatible printers - line drawing - **all included as standard**

"A genuinely exciting product and incredibly good value" (QL World 1/87)
"Shows small companies can still make magic" (Sinclair User,5 ★, 11/86)
"..this stimulating program.." (Popular Computing Weekly 8/1/87)

PRICES — VISA

FRONT PAGE 1.03	£22.50	TASKMASTER	£25.00
SIDEWAYS	£19.95	SIGN DESIGNER	£17.50
ASSEMBLER WORKBENCH	£24.95	GRAPHIQL+	£24.95
QFLASH (MDV)	£12.00	QFLASH (EPROM, + toolkit)	£25.00
SWOPPER	£19.95	PASCAL (COMPUTER ONE)	£39.95
Q_LIBERATOR	£60.00	EXPANDERAM 512K	£120.00
PRINTER RIBBONS	RING		

FRONT PAGE CLUB MEMBERSHIP £10.00 PER YEAR
For discounts on software, plus newsletter. **Ring or write for details.**

Prices include postage within Europe. Please add £0-50 **per item** outside Europe. Payment for export orders by Eurocheque or cheque drawn on a U.K. bank. Otherwise add £5-00 for clearing charges.

WAR in the EAST

Scenario I—Barbarossa 1941
Scenario II—Stalingrad 1942
Scenario III—Destruction of Army Group Center 1944

This is a military strategy and tactics game for 1 player. It is not an arcade or adventure game.

Features include:
- Four-way scrolling map
- 16 different types of Divisions and Brigades (Rumanian, Italian, Hungarian, Panzers, SS, etc)
- Partisans, weather, terrain
- All aspects of the Eatern Front are covered

Master Program & Scenario I **£19.95**
Master Program + All 3 Scenarios **£39.95**
Scenarios II, III (each) **£13.50**

ZX Computing Aug. '86 . . . *"A real challenge and requires thought and planning."*

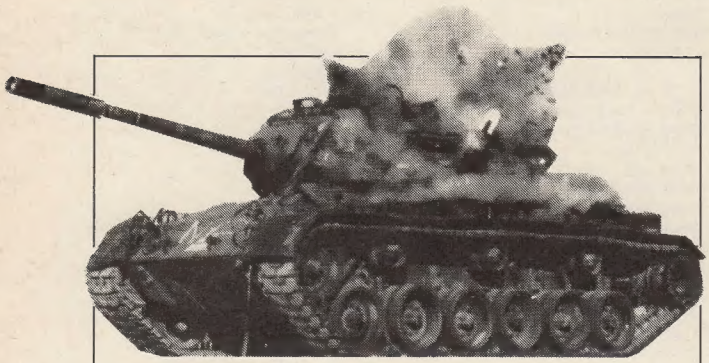
Time Designs U.S.A. . . . *"In its way the equal of Psions games."*

SHARP'S INC.
Rt. 10, Box 459
Mechanicsville, VA 23111 U.S.A.
Tel: (804) 746-1664

T K COMPUTERWARE
Unit A,
Range Road Industrial Estate,
Hythe, Kent CT21 6HG.
Tel: 0303-81-2801
Tlx: 966676 PMFABG

Access MasterCard VISA AMERICAN EXPRESS

Dealer Inquiries Welcome!



TANK BUSTERS from Sellasoft

"Tank Busters is superb in every respect. The feeling of realism is unequalled by any other game of which I can think. If you never buy another game for the QL, make sure you have this one" *(January QL World).*

Or, send cheque/postal order £14.95 + 35p p&p to:

SELLASOFT
23 Loveridge Avenue,
Kempston,
Bedford
MK42 85F

Data-Skip presents...Seiko RC-1000, Wrist Terminal

JOE BROWN
213-123-4567

Memo Function. Can be used to store telephone numbers, client lists, schedules input from a personal computer. There's no limit to its uses. Data entries have a maximum length of 24 characters, and can be output on the watch display whenever, wherever you wish. The Memo function is the heart of the Wrist Terminal.

MEETING 335
10/15 A10:30

Schedule Alarm Function. Input the month, day, hour, and minute, for schedule entries and your Wrist Terminal alert you when the date and time came by beeping and displaying a twelve-character message on the screen. Invaluable for the businessman, of course, but the Wrist Terminal can also remind you of special personal days, for example, birthdays or anniversaries, that are so embarrassing to forget.

DANCE LESSON
5 FRI P06:00

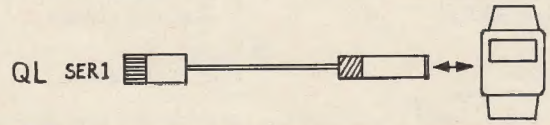
Weekly Alarm Function. Tuesdays at 9:30 there's a meeting, Thursdays at 7:00 you go to your sports club, Fridays...The Weekly Alarm function is just the thing for today's busy people. Input the day of the week, hour, and minute, and each week at the proper time the Wrist Terminal will beep and display a twelve-character message to remind you.

FRANKFURT
AM 02:08 42

World Time Function. What time is it now in London? New York? Just input the time differences and afterward you can know the time anywhere in the world, instantly, with this internationally oriented function. Be sure to input the place name, too, in up to twelve characters.

84 10/14 A
SUN 10: 08 42

Watch Function. The Wrist Terminal has a full set of Time Keeping functions, including a built-in alarm which will beep at the same time each day and a calender which will automatically tell you the year, month, and day accurately from now until the year 2020. It has an hourly time signal, too.



The Seiko RC-1000 is a wrist-terminal with 2K of free memory to store addresses, telephone numbers etc. (max. 80).

Also has extensive alarm-facilities. Fully programmable on your QL. Data-transmission via Ser-1 port.

Complete package (containing Transmission Software, interconnecting-cable and Watch)

Now only..... £49.95

(Also Spectrum/interface I versions available. Please state)

Please add £1 for P & P. Orders: send us a cheque or postal order.

(No Visa or C.O.D.) made payable to:

DATA-SKIP, L. Willemsteeg 10, 2801 WC Gouda, Holland.
Tel: 1820-20581

TRANSFORM LTD. Computer Accessories

MAIL LIST £24.95

Allows you to retrieve names & addresses from within ARCHIVE. Other features include single key functions, prints address labels, exports files to Quill also compatible with our stock control.

STOCK CONTROL £24.95

Keeps records of all stock items including retail price, trade price, minimum order level, items on order & many other features.

QL APPOINTMENT DIARY £24.95

Records appointments dates & times, can be used as diary, dentist, doctors, hairdressers, service engineers. Program allows 26 users, up to 40 appointments per day plus many other features.

QSPELL £24.95

Spelling checker for Quill supplied with 25000 words, checks an A4 page in 24 secs.

PAYROLL £63.25

Calculates weekly, monthly or 4 weekly payroll full tax calculations, coin analysis & payment rounding.

ARCHIVE

Our team of programmers are able to write programs to your requirements, phone for further details.

QL KEY DEFINE £9.95

For those who use Quill or SUPERbasic this program is a must allowing you to define up to 2k on each key.

QL CALC £9.95

Enables you to press CTRL & any other key to give you a full calculator. Compatible with Quill, Archive, Abacus & Easel. Many other features.

QL SWITCH £14.95

Allows users with extra memory to run Quill, Archive, Abacus & Easel at the same time or two Archive programs & Quill.

RAM DISC £14.95

Enables users with extra memory to set up a ram disc; programs can then be instantly saved & re-loaded. A printer spooler is also included to allow you to print whilst using other programs.

TOOL KIT £9.95

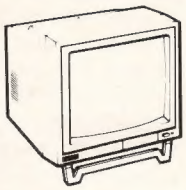
This program will copy all or selected files, delete one or selected files, display file to screen, change file name, format & print multiple copies of Quill files.

INVOICING £49.95

Sales day book, sales ledger & audit trail, for disk only, holds up to 4500 invoices with names & addresses, invoice address, plus multiple delivery addresses, links with stock control, retains invoices, also available Three part paper printed for invoicing.

New

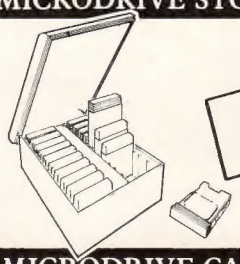
MONITORS



£86.25

Philips 7502 ..... **£86.25**
Please add **£5.75** for delivery.

MICRODRIVE STORAGE BOX



£4.95

MICRODRIVE CARTRIDGES

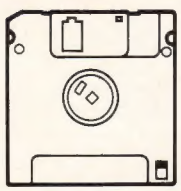
Single **£1.75**
Box + 10 cartridges **£22.45**
Box + 20 cartridges **£39.95**
Please add **£1.00** p&p on boxes.

PRINTER PAPER

2000 sheets continuous paper **£13.00**
700 sheets 3 part paper **£24.40**
1000 continuous labels **£6.65**
Please add **£3.75** p&p on paper **£1.30** on labels.

DISKS

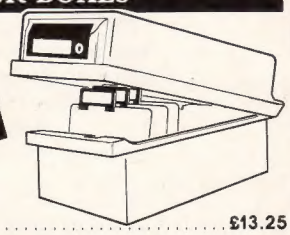
DOUBLE SIDED DOUBLE DENSITY DISKS



£3.00

DISK BOXES

£13.25



3½" box holds 40 ..... **£13.25**
3½" jumbo box holds 80 ..... **£17.00**
Please add **£1.30** p&p for disks & boxes.

ACCESSORIES

Monochrome monitor lead **£5.75**
RS 232 lead **£11.50**
Centronics interface **£19.50**

DISK DRIVES & INTERFACES

Cumana disk interface **£79.90**
Sandy disk interface **£215.00**
Single 720k disk drive **£139.90**
Dual 1440k disk drive **£241.50**
Please add **£5.75** p&p.

MEMORY EXTENSIONS

512K **£99.00**

ORGANISER

Psion organiser XP **£139.50**
RS 232 link **£47.95**
64k data pack **£79.95**

QL to ORGANISER **£39.95**

QL to PC **£29.95**

XCHANGE £295.00

Xchange is available from Transford Ltd. to run on the following: IBM PC/XT/AT & IBM compatibles, APRICOT PC, F series, XEN, ICL DRS20, DRS300, OPD, LOGICA KENNET, MERLIN 4000, VICTOR SEREIUS, TORCH GRADUATE & BT TONTO. We offer on site training & database applications to suit your requirements. Network upgrades enables XCHANGE to run up to 10 workstations. Evaluation packs available for **£10.00**.

PC FOUR £79.95

A cut-down version of Xchange as supplied on the QL but with the added facility of 65,535 entries in Archive, 999 lines in Abacus & mail merge plus key define built into Quill.

PRINTERS

LX 86 215·00 +vat

DOT MATRIX

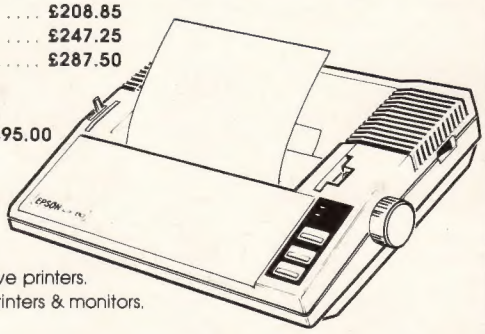
Citizen 120D **£209.00**
Seikosha SP180 A **£208.85**
Epson LX 86 ..... **£247.25**
Taxan Kaga **£287.50**

DAISYWHEEL

Brother HR20 daisy wheel **£495.00**

ACCESSORIES

LX tractor feed **£20.70**



We also stock ribbons for the above printers.
Please add **£5.75** for delivery of printers & monitors.

PSION XCHANGE

ARCHIVE DATABASE

Multifile relational database. Only memory restricts the number of files in use at one time. Variable length records with a maximum of 255 characters per field, 255 fields per record, 65535 records per file. Command language allows the user to define procedures using a powerful editor. Flexible multifile indices provide fast access and a form designer for screen and printer input and output.

QUILL WORDPROCESSOR

Text and page formatting, underlining, bold, italic, superscript, subscript, justification, tabs, line spacing, page size, page headers, footers and numbering. On screen editing, fast page access, cut and paste, block copy, block move, insert/ overwrite modes, search and find, search and replace, key define and mail merge. Document size only restricted by disk capacity, background printing allows the user to print documents while working on others.

£295 INC. VAT

EASEL BUSINESS GRAPHICS

3D Business graphics including bar, line and pie charts, no limit to the number of values or numbers or sets of figures. Automatic rescaling, user define colours, text annotation of graphs at any pixel point. Intelligent evaluation of data formulae or manipulation of existing data. Images stored in internal format; monitor resolution is the only limit on final image quality. Accepts data from spreadsheet, database, etc.

ABACUS SPREADSHEET

Expansive spreadsheet with 999 rows, 255 columns, virtual memory system buffers to disk only when full, facilitating very large spreadsheets. Efficiency memory used only for full cells, each cell only uses 14 bytes. Variable width cells, block copy, block move, insert/ delete columns and rows, merge and consolidation of data from different spreadsheets. Accurate to 15 significant figures, full range of mathematical, scientific, date, average, ASCII and DIF conversion.

PC FOUR £79.95

Access

TRANSFORM LTD (DEPT. QL) 01-658 6350
Mail order only. 24 West Oak, Beckenham, Kent. BR3 2EZ

VISA

STRONG COMPUTER SYSTEMS

BRYN COTTAGE, PENIEL, CARMARTHEN, DYFED SA32 7DJ. TEL: 0267-231246

THE ASTRACOM 1000 MULTISTANDARD INTELLIGENT MODEM £198.00
Complete with Communications Software for Prestel Etc.
128K QL Computer ..... £149.00 640K QL Computer £259.00
Special Offer: Silver Reed plotter with Talent Technikit only..... £199.00
Special offer: Psion set of 2.3 software only £9.95 QL Service Manual ..... £ 19.95
QUALITY PRINTER STAND Suitable for any 80 Col Printer ONLY £59.00
Small Footprint & Dial Control for smooth paper feed
QRAM: BY TONY TEBBY - A HOST OF POPUP UTILITIES £29.00

PRINTER PRICES INCLUDE MIRACLE SYSTEMS INTERFACE

Seikosha 1300CPS (colour option £109 extra) £459.00
Seikosha SP180 with printer stand £259.00
SEIKOSHA SP180 ..... £219.00
CANON PW1080 ..... £289.00
KAGA TAXAN KP910 ..... £419.00
QUEN DATA DAISYWHEEL £199.00
2000 Sheets Fanfold paper Micro Perf ..... £ 19.00
2000 Sheets Fanfold Paper (supplied with printer) ..... £ 16.00
MIRACLE SYSTEMS PARALELL INTERFACE ..... £ 20.00

MONITORS (Cables Included)

Microvitic Cub 1451/DQ3 Colour £249.00
Microvitic Cub 1451/DQT3 with Swivel Stand £269.00
Swivel Stand for Microvitic ..... £ 25.00
Phillips BM7502 20MHZ Green (RECOMMENDED FOR THE QL) ... £ 99.00

ACCESSORIES

CLEANING KIT IN CARRYING CASE ..... £ 27.00
3250 WATT MAINS FILTER ..... £ 36.00
MIRACLE SYSTEMS MODAPTOR ..... £ 36.00
MICROSTICK JOYSTICK WITH ADAPTOR ..... £ 16.00
20 CARTRIDGES WITH TRANSFORM BOX ..... £ 40.00
10 CARTRIDGES WITH TRANSFORM BOX ..... £ 23.00
4 Microdrive Cartridges .. £ 8.00 Transform box ..... £ 5.00
Joystick Adaptor ..... £ 5.00 Para Cable for Memodisk .. £10.00
Serial Printer Cable ..... £ 8.00 10 DS/DD 5.25" Disks £19.00

RIBBONS

BROTHER M1009 ..... £ 5.50 MT80 or Shinwa ..... £ 6.00
QUEN DATA ..... £ 6.00 SP1000A (Sinclair) ..... £ 7.50
TAXAN/CANNON ..... £ 8.00 EPSON RX/MX/FX ..... £ 6.50
EPSON LX80 ..... £ 5.00 CITIZEN 120D ..... £ 6.50

DISK & RAM UPGRADES

MEMODISK includes Disk Interface + 512K RAM + Paraport + Toolkit EPROM
with Multitasking, Windows, Icons RAM disk, Wild Card etc. £199.00

Above with NEC DUAL DRIVES £399.00
Miracle Systems 512K EXPANDERAM ..... £ 99.00
Internal D.I.Y. 512K RAM board ..... £ 99.00
Internal 512K RAM Board fitted by us £126.00
NEC Dual 3.5" Disk Drives £209.00
NEC Dual Drives + Interface £289.00
NEC Dual Drives + Interface + Expanderam or Internal £379.00
10 quality DS/DD 3.5" disks in library case ..... £ 26.00
Lockup disk storage box for 40 3.5" disk ..... £ 14.00
Lockup disk storage box for 90 3.5" disk ..... £ 18.00
SPECIAL OFFER: 20 3.5" disks + free storage box for 40 disks ..... £ 58.00

SOFTWARE

BUSINESS

CASH TRADER DISK OR CART ..... £ 39.00
PROJECT PLANNER ..... £ 24.00
DESCISION MAKER ..... £ 24.00
ENTREPRENEUR ..... £ 24.00
QL HOME FINANCE ..... £ 21.95
PCB DESIGNER1 ..... £ 89.00
PCB DESIGNER 2 ..... £ 89.00
TALENT TECHNIQL ..... £ 44.00
CONCEPT 3D CAD ..... £ 34.00
RUBICON VIEWPOINT ..... £ 24.95
DIGITAL EYE Q ..... £ 24.00
QDRAW ..... £ 14.95
QL PAINT ..... £ 15.95
SIGN DESIGNER ..... £ 19.00
FRONT PAGE ..... £ 22.50
PRO ASTROLOGER CART/DISK ..... £ 49.00
PRO ASTROLOGER + ASTRONOMER ..... £ 59.00
THE INVESTMENT MONITOR ..... £ 19.95

UTILITIES

TOOLKIT II ON EPROM ..... £ 29.00
DIGITAL MEDIA MANAGER ..... £ 35.00
TALENT CARTRIDGE DOCTOR ..... £ 13.00
QMON MONITOR/DEBUGGER ..... £ 18.00
TURBO TOOLKIT ..... £ 24.00
QFLASH RAMDISK + TOOLKIT ..... £ 19.00
BETTER BASIC EXPERT SYSTEM ..... £ 29.00
EIDERSOFT ICE COMPENDIUM ..... £ 59.00
EIDERSOFT ICE ROM + CHOICE ..... £ 39.00
EIDERSOFT ICE TOOLKIT ..... £ 10.00
EIDERSOFT ICE ARTICE ..... £ 13.00
EIDERSOFT ICE CHOICE ..... £ 15.00
EIDERSOFT ICE EPROM ..... £ 24.00
EIDERSOFT QSPELL DISK ..... £ 23.00
EIDERSOFT QSPELL CART ..... £ 20.00
TALENT TECHNIKIT ..... £ 24.00
TALENT QIMP ..... £ 39.00
TALENT BASIC-ALLY ..... £ 29.00
RAM DISK & PRINT SPOOLER ..... £ 9.00
TALENT SIDEWAYS ..... £ 19.00
TALENT QL TOOLSET ..... £ 19.00
SECTOR TASKMASTER ..... £ 25.00

LANGUAGES

GST MACRO ASSMBLER ..... £ 34.00
METACOMCO ASSEMBLER ..... £ 29.00
METACOMCO BCPL ..... £ 49.00
METACOMCO LISP ..... £ 49.00
METACOMCO PASCAL ..... £ 69.00
METACOMCO 'C' ..... £ 79.00
METACOMCO APL ..... £ 89.00
PRO FORTRAN 77 ..... £ 89.00
PRO PASCAL ..... £ 89.00
QL LIBERATOR ..... £ 69.95
DIGITAL TURBO ..... £ 79.00
DIGITAL THE EDITOR ..... £ 24.00
DIGITAL BASIC COMPILER ..... £ 49.00
DIGITAL FORTH + REVERSI ..... £ 24.00
TALENT WORKBENCH ..... £ 24.00

LEISURE

MICRODEAL HOPPER ..... £ 5.00
MICRODEAL CUTHBERT/SPACE ..... £ 6.00
MICRODEAL CRAZY PAINTER ..... £ 5.00
MICRODEAL LANDS OF HAVOC ..... £ 9.95
MICRODEAL THE KING ..... £ 14.95
MICRODEAL AQUANAUT 471 ..... £ 18.95
QL CLASSIC ADVENTURES ..... £ 9.95
QL JABBER ..... £ 9.95
QL QBOIDS ..... £ 9.95
QL CAVERNS ..... £ 9.95
QL BOUNDER ..... £ 8.00
QL REVERSI ..... £ 8.00
QL METEOR STORM ..... £ 8.00
QL THE PAWN ..... £ 19.95
WAR IN THE EAST COMPLETE ..... £ 39.00
WAR IN THE EAST (SCEN 1) ..... £ 20.00
WAR IN THE EAST (SCEN. 2 or 3) ..... £ 13.00
DIGITAL SPRITE GENERATOR ..... £ 19.95
DIGITAL SUPERBACKGAMMON ..... £ 11.95
DIGITAL SUPER ARCADIA ..... £ 12.95

ADVENTURE WRITING SYSTEM ..... £ 22.00
DIGITAL SUPER ASTROLOGER ..... £ 22.95
DIGITAL BLOCKLANDS ..... £ 9.95
DIGITAL DROIDZONE ..... £ 9.95
AMBITION ..... £ 29.95
PYRAMIDE VROOM ..... £ 14.95
PYRAMIDE WANDERER 3D ..... £ 19.95
PYRAMIDE MORTVILLE MANOR ..... £ 18.95
PYRAMIDE NUCLEON ..... £ 18.95
PYRAMIDE PEINTRE ..... £ 14.95
PYRAMIDE MR. SMITH ..... £ 12.95
TALENT WEST ..... £ 12.95
TALENT ZKUL ..... £ 12.95
TALENT COSMOS ..... £ 12.95
TALENT THE LOST PHAROH ..... £ 13.95
TALENT JUNGLE EDDI ..... £ 13.95
TALENT NEMESIS ..... £ 13.95
TALENT NEMISIS + SOUNDTRACK ..... £ 16.95
TALENT STRIP POKER ..... £ 13.95
TALENT OXFORD TRIVIA ..... £ 16.95
RUBICON DRAGONHOLD ..... £ 14.95
LEISURE GENIUS SCRABBLE ..... £ 12.95
HYPERDRIVE ..... £ 12.95
STEVE DAVIS SNOOKER ..... £ 12.95
DATALINK 3D SLIME ..... £ 11.95
BRIDGE PLAYER II ..... £ 17.95
PSION CHESS ..... £ 16.95
PSION MATCHPOINT ..... £ 12.95
SQUADRONS ..... £ 13.95
BARON ROUGE ..... £ 17.95
GWENDOLINE ..... £ 17.95
KNIGHT FLIGHT ..... £ 12.95
DATALINK CADPAK ..... £ 14.95
EIDERSOFT SPOOK ..... £ 9.95
EIDERSOFT BJ 3D ..... £ 9.95
EIDERSOFT BJ RETURNS ..... £ 9.95
EIDERSOFT KARATE ..... £ 13.95
EIDERSOFT CITADELL ..... £ 8.95
SECTOR TOUCH TYPIST ..... £ 12.00
DS. ENTERPRISES QL MULTITASK ..... £ 14.95

ALL PRICES INCLUDE VAT & CARRIAGE